FOREST RESEARCH IN THE MIDSOUTH

Robert W. Neelands

SOUTHERN FOREST EXPERIMENT STATION
FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE

Millions of southern acres lay desolate after their timber wealth was harvested in the early 1900's.

THEN

It wasn't really a room at all, according to one of the early members of the technical staff —it was merely a partitioned-off end of a hallway. But it housed the four foresters and the secretary who made up the Southern Forest Experiment Station when it was established in July 1921.

In his first annual report, Director R. D. Forbes stated stoically that "Equipment is adequate for present purposes, particularly as all members of the staff are rarely in the office at the same time."

But he hinted at the handicaps, too: "On the other hand, there is, of course, absolutely no opportunity for experimental work—beyond germination tests and similar small pieces of work which can be done in an office building."

With the very modest staff and facilities available, the southern forestry situation must have seemed overwhelming. Here are some excerpts from that first annual report:

". . . It is reasonable to expect that eventually not less than 25 million acres in the South will require artificial reforestation."

"A study of the effect of fire upon longleaf pine was cut short by fires in the check plot."

"Very little has been done in nursery work in the South . . . ."

" . . . The greater part of the pineywoods of the Coastal Plain is burned over on an average of once a year."

" . . . In the vicinity of villages or farms, where razor-back hogs are numerous, it is out of the question to reproduce longleaf pine."

Late in 1921, Director Forbes accepted an offer of 2 acres of land at McNeill, Mississippi, for use as a nursery and transplant bed. Thus began Forest Service research in what was then the Southern Station's assigned area of " . . . the Coastal Plain of the States from South Carolina to Oklahoma and Texas, including the Ouachita Mountains of Arkansas."

First research facilities of the Southern Station were mostly crude and crowded.

AND NOW

Changes at the Southern Station since 1921 have been as dramatic as those of the forests.

The small makeshift room that housed the Station in its first year has been replaced by offices and laboratories in seven States. The latest tools and equipment are being made available to specialists in the many sciences that together make up modern forest research. The staff has grown from the four men known simply as "foresters" to more than 125 scientists carrying out investigations in many different problems. More than 200 other men and women assist these researchers.

Modern laboratories, recently added to the Station's facilities, have strengthened and broadened several major research programs. One at Gulfport, Mississippi, houses the Institute of Forest Genetics, the Wood Products Insect Laboratory, and the Forest and Wood Products Disease Laboratory. Others include the Southern Hardwoods Laboratory at Stoneville, Mississippi, the Timber Management Laboratory at Crossett, Arkansas, and the forestry complex at Alexandria, Louisiana.

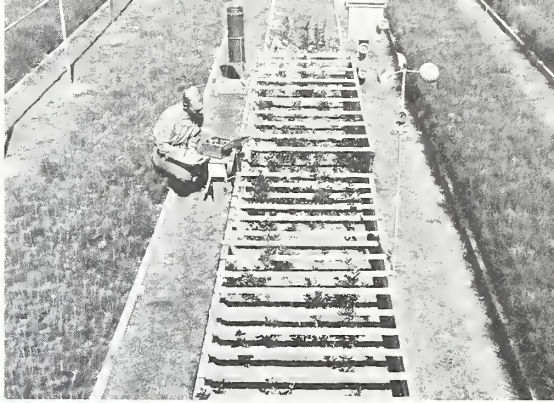
Managed, productive woodlands now form a basis for the South's vigorous forest economy.

Research at the Southern Station, as at Stations in other areas of the U. S., is organized by field projects. These projects are identified with either a forest type and geographic region, a climatic zone, or a subject-matter field.

The years since 1921 have also brought tremendous change to the southern forest. The last commercial holdings of virgin timber were cut; much poor farmland was abandoned and allowed to revert to trees; lands good for agriculture were cleared; second-growth stands became the resource supporting a multibillion dollar forest industry. In the last 4 decades the South has gone far in the transition from wild to managed forest lands.

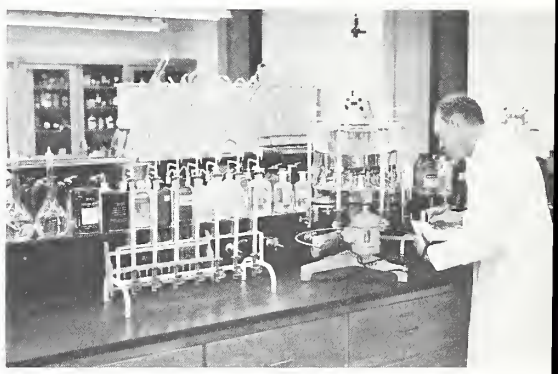
Research is playing a vital part in that transition. In management, reforestation, protection, utilization, and inventory, research-developed techniques have brought vast benefits to the South. In almost all phases of the huge southern timber economy, the effects of research have meant more jobs and more money. The quality of forest seed and growing stock is being improved; stand and plantation management is becoming steadily more efficient; devastations from fires, insects, and diseases are being reduced; high-quality wood products are being manufactured—with increasing efficiency—into a widening array of new and useful products.

But despite these advances, much remains to be done. The following pages describe opportunities for even greater research achievements, and our plans for accomplishing them.



Modern experimental nurseries make possible intensive experimentation in pine and hardwood regeneration.

Laboratories such as the one at Gulfport, Mississippi, have broadened the scope of forest research.



Highly trained scientists use the latest equipment and instruments to further their understanding of the forest environment.

RESEARCH --

TIMBER MANAGEMENT

1. Measuring southern forests
2. Silviculture in the Ozark pine type
3. Artificial regeneration of southern pines
4. Silviculture of longleaf pine: sandhill regeneration
5. Silviculture in the moisture-tension zone
6. Silviculture in plateau forests
7. Silviculture of southern hardwoods
8. Silviculture in the loblolly-shortleaf pine type
9. Genetics of pines and hardwoods

WATERSHED MANAGEMENT

10. Water timing
11. Coastal-Plain hydrology
12. Watershed rehabilitation
13. Management of erosive watersheds

RANGE MANAGEMENT

14. Southern pine cattle ranges

WILDLIFE MANAGEMENT

15. Wildlife habitat in southern forests

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17. Insect enemies of hardwood trees
18. Insect enemies of pines

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20. Diseases of pines—in forests and nurseries
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24. Timber supply and demand potentials
25. Marketing

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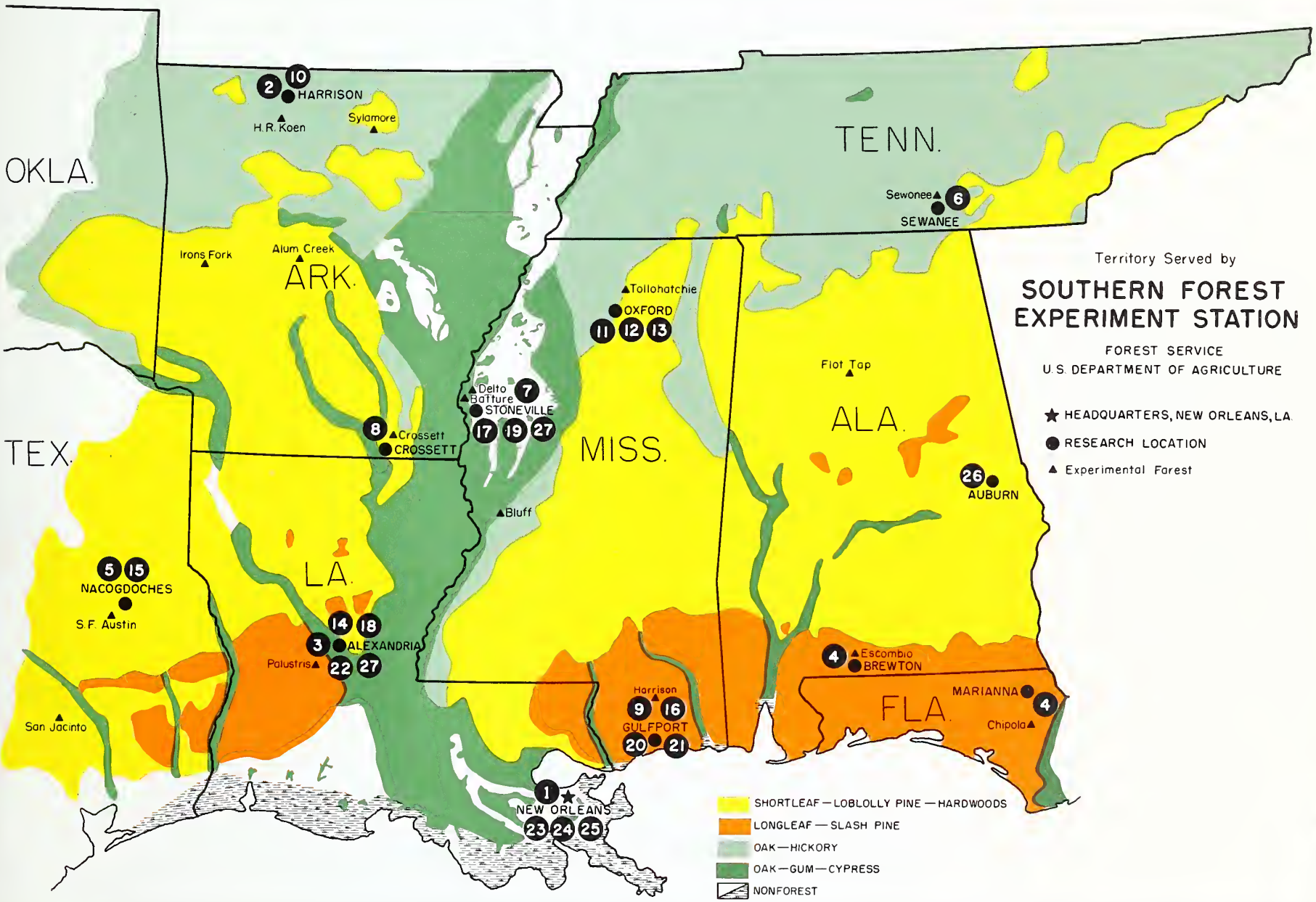
26. Forest engineering systems

FOREST PRODUCTS UTILIZATION

27. Improvement in timber utilization technology

--- LOCATIONS


OKLA.
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FLA.
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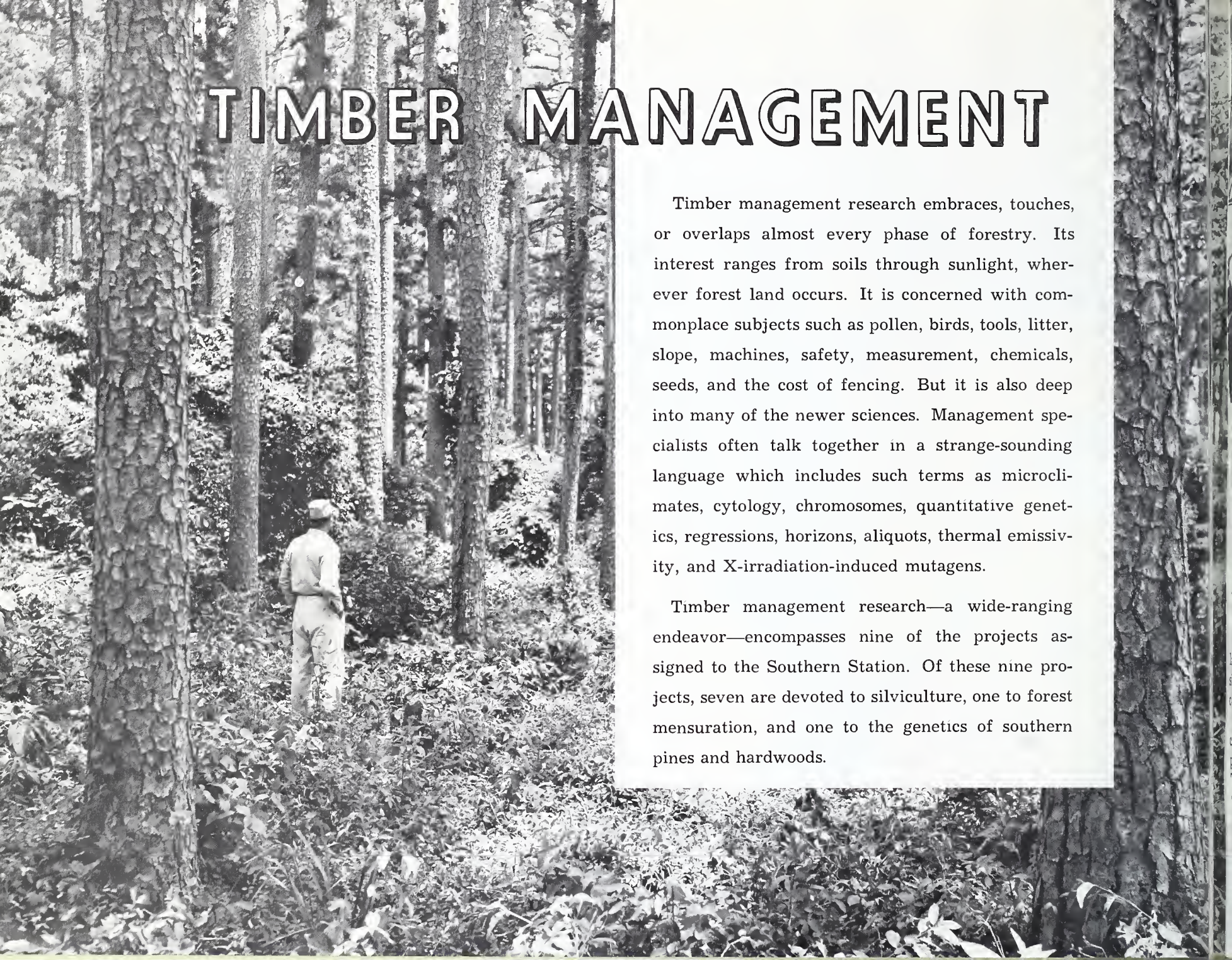
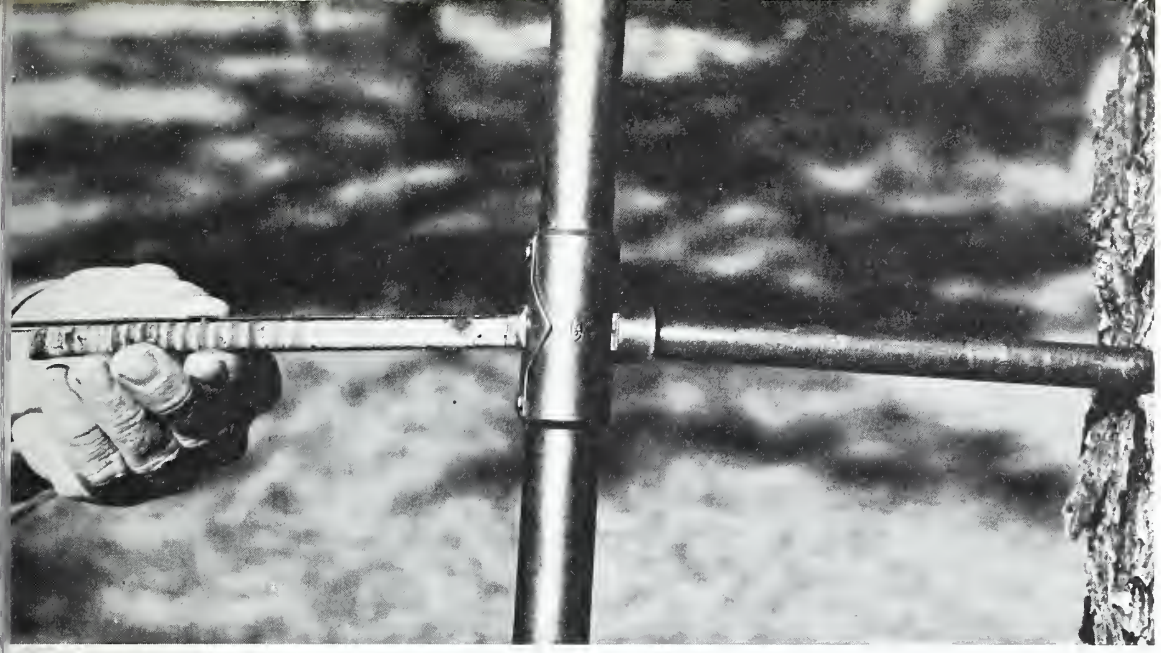
Tallahatchie
OXFORD 11 12 13
Flat Top
Delto 7
Batture
STONEVILLE 17 19 27
8 Crossett CROSSETT
Bluff
26 AUBURN
5 15 NACOGDOCHES
S.F. Austin
14 18
3 ALEXANDRIA 22 27
Palustris
4 Escambia BREWTON
Harrison
9 16 GULFPORT 20 21
MARIANNA 4
Chipola
San Jacinto
1 NEW ORLEANS 23 24 25
Territory Served by
SOUTHERN FOREST EXPERIMENT STATION
FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE
HEADQUARTERS, NEW ORLEANS, LA.
RESEARCH LOCATION
Experimental Forest
SHORTLEAF—LOBLOLLY PINE—HARDWOODS
LONGLEAF—SLASH PINE
OAK—HICKORY
OAK—GUM—CYPRESS
NONFOREST



TIMBER MANAGEMENT

Timber management research embraces, touches, or overlaps almost every phase of forestry. Its interest ranges from soils through sunlight, wherever forest land occurs. It is concerned with commonplace subjects such as pollen, birds, tools, litter, slope, machines, safety, measurement, chemicals, seeds, and the cost of fencing. But it is also deep into many of the newer sciences. Management specialists often talk together in a strange-sounding language which includes such terms as microclimates, cytology, chromosomes, quantitative genetics, regressions, horizons, aliquots, thermal emissivity, and X-irradiation-induced mutagens.

Timber management research—a wide-ranging endeavor—encompasses nine of the projects assigned to the Southern Station. Of these nine projects, seven are devoted to silviculture, one to forest mensuration, and one to the genetics of southern pines and hardwoods.



Increment cores furnish information on growth and wood density, but researchers seek faster and more efficient ways of evaluating forest stands.

MEASURING SOUTHERN FORESTS

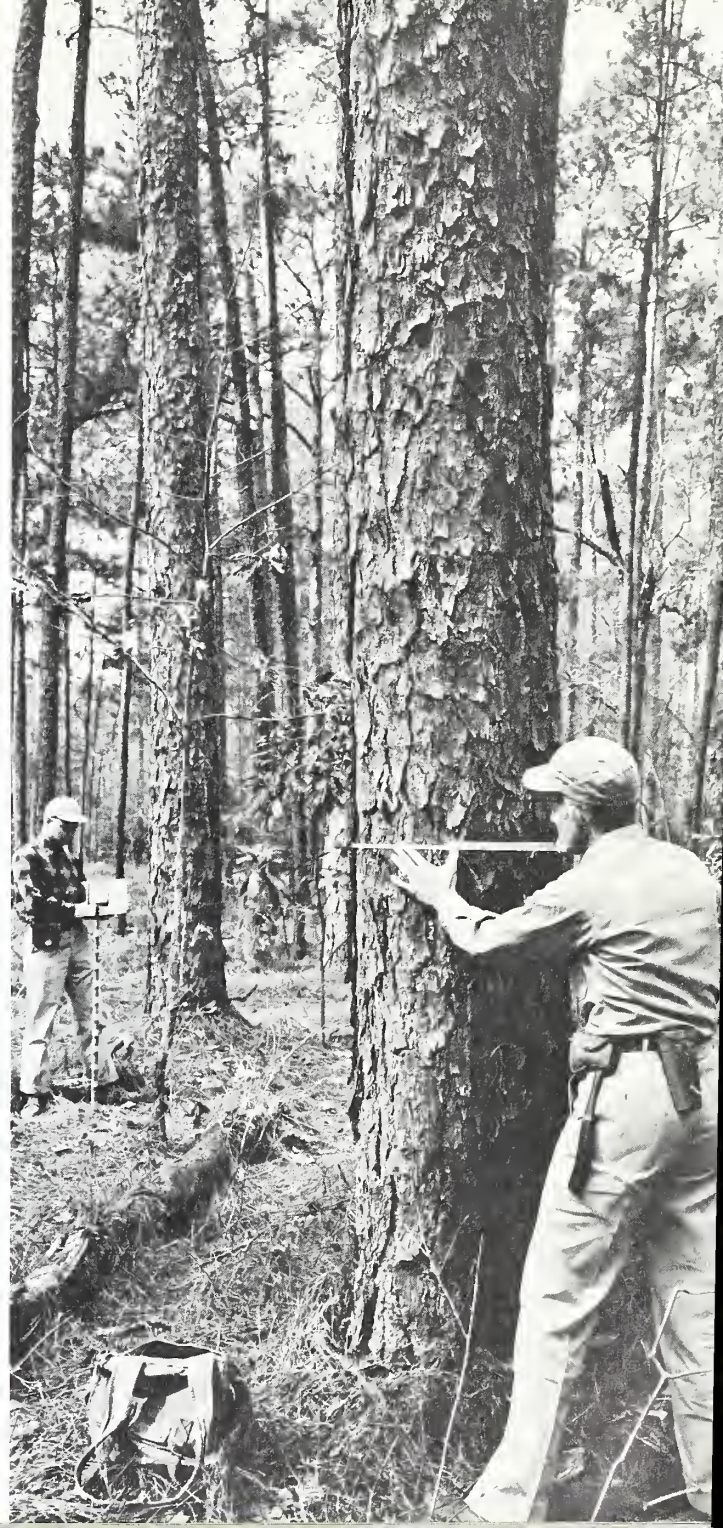
New Orleans

Forest stocking is ideal when a particular site supports the kinds, numbers, and sizes of trees for the maximum production of which the site is capable.

But how do we measure stocking? By certain cross-sectional area of tree stems per acre? Tree diameters? Tree heights? Tree-area ratio? Distance between tree trunks? The most common yardstick is "what looks about right."

The best brains in forestry are still uncertain as to which stocking measure to use. Since forestry began, foresters have searched for some way to measure the capacity of a tree (or a group of trees) to grow in volume and value. Many theories have been tried, but only recently has progress been made.

The Southern Station's research project in forest mensuration is headquartered at New Orleans. Established in 1961, it is tackling the complex problem of growth in relation to stand and site factors. The project's ultimate aim is to be able to predict the growth of any stand, and (even more important) to tell what kind of stand will produce desired products quickly, in the largest quantity possible.



SILVICULTURE IN THE OZARK PINE TYPE

Harrison, Arkansas

The Arkansas Ozarks: 11 million acres, two-thirds forested; much of the forest abused and growing low-grade timber; rainfall erratic, droughts common; soils and topography highly variable within short distances.

There, indeed, is a problem. Can it possibly be considered an opportunity? The answer is "yes;" the area has great potential.

First of all we know that Ozark trees can be valuable. Among the hardwoods, for instance, good white oak always finds a ready and profitable market. It is unequalled for bourbon barrel staves, and brings premium prices for veneer and flooring.

Abused forests of the mountainous regions of the South present special problems of regeneration and management.

Shortleaf—the only one of the four major southern pines native to the Ozarks—survives rugged sites and seasons; its wood is utilized for construction and pulp.

The research project at Harrison is working in three major fields to develop profitable management techniques for Ozark forests:

Species adaptability. There is an urgent need to understand the relationships between soil, site, and tree species.

Stand conversion. A great opportunity obviously lies in converting low-grade stands to pine and good hardwoods. Researchers will test various methods of site preparation, seeding, and planting.

Silviculture. Until the past few years, "silviculture" in the region consisted mainly of cutting anything that looked merchantable. What the forest scientists at Harrison can learn about proper methods and cycles of harvesting tree crops, inducing successful natural regeneration, and tree-spacing, will do much to help restore productivity to millions of acres of Ozark Highlands.

Machines such as this double-row disk seeder prepare the site and plant pine seed in a single pass.

ARTIFICIAL REGENERATION OF SOUTHERN PINES

Alexandria, Louisiana

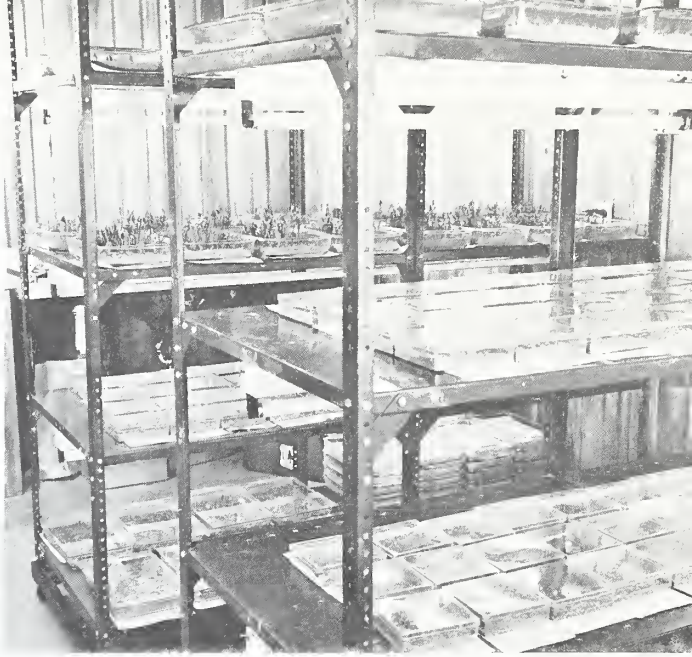
Regeneration. Direct seeding of forest trees—long considered an impossible dream—became feasible after researchers at Alexandria, in cooperation with the U. S. Fish and Wildlife Service, found effective repellents to protect pine seed from birds and rodents. The breakthrough came in 1956, and the impact on southern forestry was immediate and tremendous. In the following 7 years, nearly three-quarters of a million acres were successfully seeded at a savings of almost $5 million over the cost of planting.

Plantation management. Investigations planned or now in progress cover such diversified phases of management as control of stand density, thinning methods, cutting cycles, pruning, irrigation, drainage, and the relationships between growth and soils.

Control of forest weeds. The Alexandria unit pioneered in chemical control of cull hardwoods and weed species. Tools, formulas, and methods of application developed there are used across the South.

Tree improvement. Tree improvement research, coordinated with work at the Institute of Forest Genetics at Gulfport, seeks strains of longleaf pine naturally resistant to the brown-spot needle blight.

In late 1964, the research units moved into new quarters shared with the Kisatchie National Forest and a zone office of the Insect and Disease Control Branch of the Southern Region. This large forestry complex consists of a three-story office building, a large laboratory annex, and several auxiliary buildings; it provides space, equipment, and facilities for strengthening research in many fields.



Seed research investigates viability, germination, and the effects of the chemical seed coatings used to repel birds and rodents.

Small fixed-wing aircraft can sow pine seed on 1,500 acres per day; the seed is protected by coatings developed by the Alexandria unit.

SILVICULTURE OF LONGLEAF PINE---

SANDHILL REGENERATION

Marianna, Florida

The research unit at Marianna has much to do with sand. Here, in the State's western extension, sand and hills are so inseparable that they become a single word; the Marianna project is referred to as "sandhills forestry."

Soils common to the area are essentially deep sand—infertile and dry. An early observer noted that vegetation in the area is ". . . rooted in a bed of silica, to which the term soil is but remotely applicable." The Chipola Experimental Forest, where field research is centered, is similar to some 10 million acres of excessively drained scrub-oak-dominated sandy land in Florida, Georgia, the Carolinas, Alabama, and Mississippi.

At the project's branch at Brewton, Alabama, forest scientists concentrate on longleaf pine silviculture, with special emphasis on factors critical to the species' natural regeneration. Several million acres of second-growth longleaf stands are approaching rotation age. Landowners urgently need effective, economical methods of naturally regenerating these forests.

Double-drum choppers are effective in preparing sandhills for pine regeneration.

Infertile, dry, sand soils are obstacles not only to pine regeneration but also to survival and productiveness of established plantations.

SILVICULTURE IN THE MOISTURE-TENSION ZONE

Nacogdoches, Texas

Southern pine's range is limited on the east by water, and on the west by lack of it. Within a strip 80 to 120 miles wide lying just inside the eastern borders of Texas and Oklahoma, rainfall and forests are like those of many parts of the South. But just west of this strip, annual rainfall decreases sharply within a short distance and forests quickly fade at the edge of the treeless prairies. This area of critical moisture balance is termed the "tension zone."

At Nacogdoches, researchers are trying to find the best ways to manage and propagate pine forests under the severe conditions of this zone. Established trees are not of great concern; they are better able to survive droughts and add satisfactory growth. The tough problem is that of regenerating the pine forests.

Foresters at Nacogdoches do not depend upon the uncertain natural reproduction; they concentrate on possibilities of planting and seeding. Through many experiments, they have found the limits of soil moisture critical to seedling survival. Current forest management research at Nacogdoches is concerned mainly with determining the intensity of moisture-conserving site preparation needed for good survival and growth of planted or seeded pines.

Simulated drought helps scientists study those limits of soil moisture which are critical to survival of pine seedlings.

SILVICULTURE IN PLATEAU FORESTS

Sewanee, Tennessee

In 1903, the U. S. Bureau of Forestry (which later became the Forest Service) reported on 6,655 acres of timberland near Sewanee, stating that, " . . . . $3,000 for all the timber was considered a fair offer . . . . "

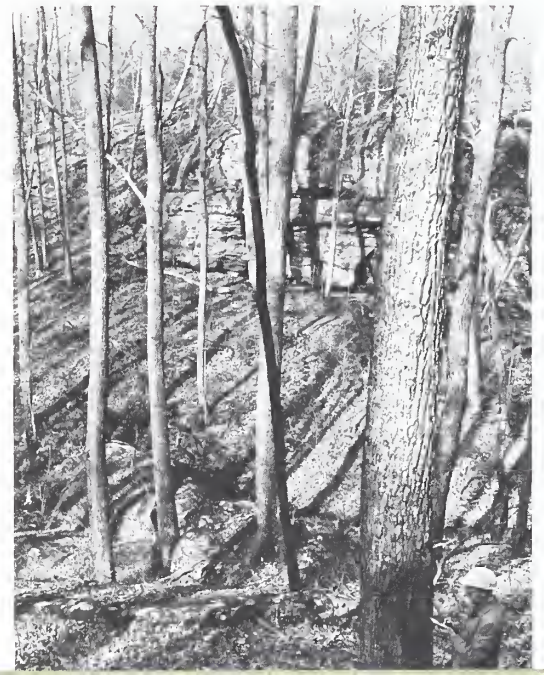
The same report says why the timber was valued at less than 50¢ per acre:

> *"Grazing, burning, and careless cutting have wrought great mischief in the plateau forest."*
>
> *"Repeated fires gradually consume all of the forest floor and render the chance of its forming again less and less likely."*
>
> *"Few seed-bearing trees are found, and most of the reproduction is by sprouts."*

In the decades since that early report, some forest areas of the highlands of north Alabama and Tennessee have responded well to good management, but most still present problems. The primary objective of research at Sewanee is to devise and test ways in which the rundown woodlands may be artificially regenerated and rebuilt to productivity. Scientists are especially concerned with finding out which tree species are best suited to the wide array of abruptly changing site qualities. This information will come about through study of the intricate relationships between tree growth, wood yields, and the many kinds of upland sites.

Shortleaf pine is a good timber species in Plateau forests. It is well adapted to the ridges and northern slopes of these highlands.

Coves of the Plateau can support valuable stands of hardwoods. Research is finding ways of rebuilding rundown stands.



SILVICULTURE OF SOUTHERN HARDWOODS

Stoneville, Mississippi

The Southern Hardwoods Laboratory at Stoneville, completed in 1962, is headquarters for the Southern Station's research into the many aspects of growing good southern hardwoods.

The Mississippi River Delta is the most productive hardwood region in North America.

The southern forest is predominantly hardwood, both in area and in timber volume. The hardwood forest of the South is a vast, valuable, and heterogeneous resource.

The Southern Hardwoods Laboratory is located at Stoneville, deep within the fertile Mississippi River Delta. In this area, on river islands, battures, bottom lands, flood plains, and wind-deposited loess uplands, valuable hardwoods thrive. Research encompasses hardwood sites in stream bottoms, coastal plains, and swamps. It includes:

Regeneration. Hardwoods are considered more difficult to regenerate than pines; we need much more knowledge to develop required techniques.

Tree improvement. Specialists are constantly seeking superior planting stock for all valuable hardwoods, and are establishing standards for assessing offspring of selected parents.

Site evaluations. Scientists at the Southern Hardwoods Laboratory have developed guides for evaluating sites for willow oak, sweetgum, cottonwood, cherrybark oak, water oak, and other important species.

Silviculture. Southern hardwood management encounters problems about which very little is known, such as species interaction, natural regeneration, protection, pruning, cutting cycles, and sprout control.

The laboratory building at Stoneville, dedicated in 1962, is finished inside with native southern hardwoods to show off their beauty and utility. Its 18,000 square feet of work space, its modern facilities and equipment, and the 1,600 square feet of greenhouses provide researchers with the tools to conduct investigations in almost any phase of growing, protecting, and marketing hardwoods. The Laboratory has three areas for field studies: the Delta, Bluff, and Batture Experimental Forests.

This experimental cottonwood plantation on batture land near Stoneville is 5 years old. Trees average 6.5 inches in breast-high-diameter and 52 feet in height.

Cutover lands in the loblolly-shortleaf pine type were often taken over by scrub hardwoods. Although young pines were frequently present, they were suppressed.

When young pines on good sites were unleashed under proper management, their growth astounded even experienced foresters.

One year's harvest on a demonstration 40-acre tract at Crossett had an on-the-stump value of $870. These products, cut in 1963, represent approximately one year's growth on the tract.

SILVICULTURE IN THE LOBLOLLY-SHORTLEAF PINE TYPE

Crossett, Arkansas

The Southern Station established the Crossett Research Center in 1934—the first field unit to be set up in the Midsouth. Surrounding Crossett were the remnants of the famed pinery which was harvested in the early 1900's. Most of the fine pine sites had been burned over repeatedly, and were covered with scrub hardwood. The Crossett unit's assignment: help find a way to put a forest back together again.

During the ensuing quarter-century, research in management of second-growth pine produced results which drew worldwide attention to Crossett. Foresters, landowners, and industries were able to see for themselves the remarkable recovery powers of these abused forests when they were given proper management.

In recent years, Crossett research has shifted emphasis to more basic investigations—from "how" to "why." Scientists are probing beneath the bark, and even under the forest floor, to search out trees' inner secrets. Subjects under study include water and soil-nutrient use by trees, root growth, seed and cone production, crown development, the effects of soil texture and slope, and the relationship between wood density and management methods.

Much of the research at the Institute of Forest Genetics at Gulfport has involved controlled breeding. More than 160,000 pedigreed seedlings are in plantation.

This diallel-cross study at the Institute of Forest Genetics contains progeny resulting from crossing a selected group of parents in all possible combinations. Diallel crosses are the best method yet devised for analyzing the detailed mechanism of inheritance.

Geneticists constantly seek trees whose form and vigor make them outstanding sources of seed. The search includes both pines and hardwoods.

GENETICS OF PINES AND HARDWOODS

Gulfport, Mississippi

There are about 105 billion trees in the South. No two of these trees are identical. They vary in countless ways; in size, shape, growth rate, wood density, root structure, needle length, color, resistance to pests, and so on. Heretofore we have used this wild stock to reproduce forests in almost complete ignorance of its genetic desirability.

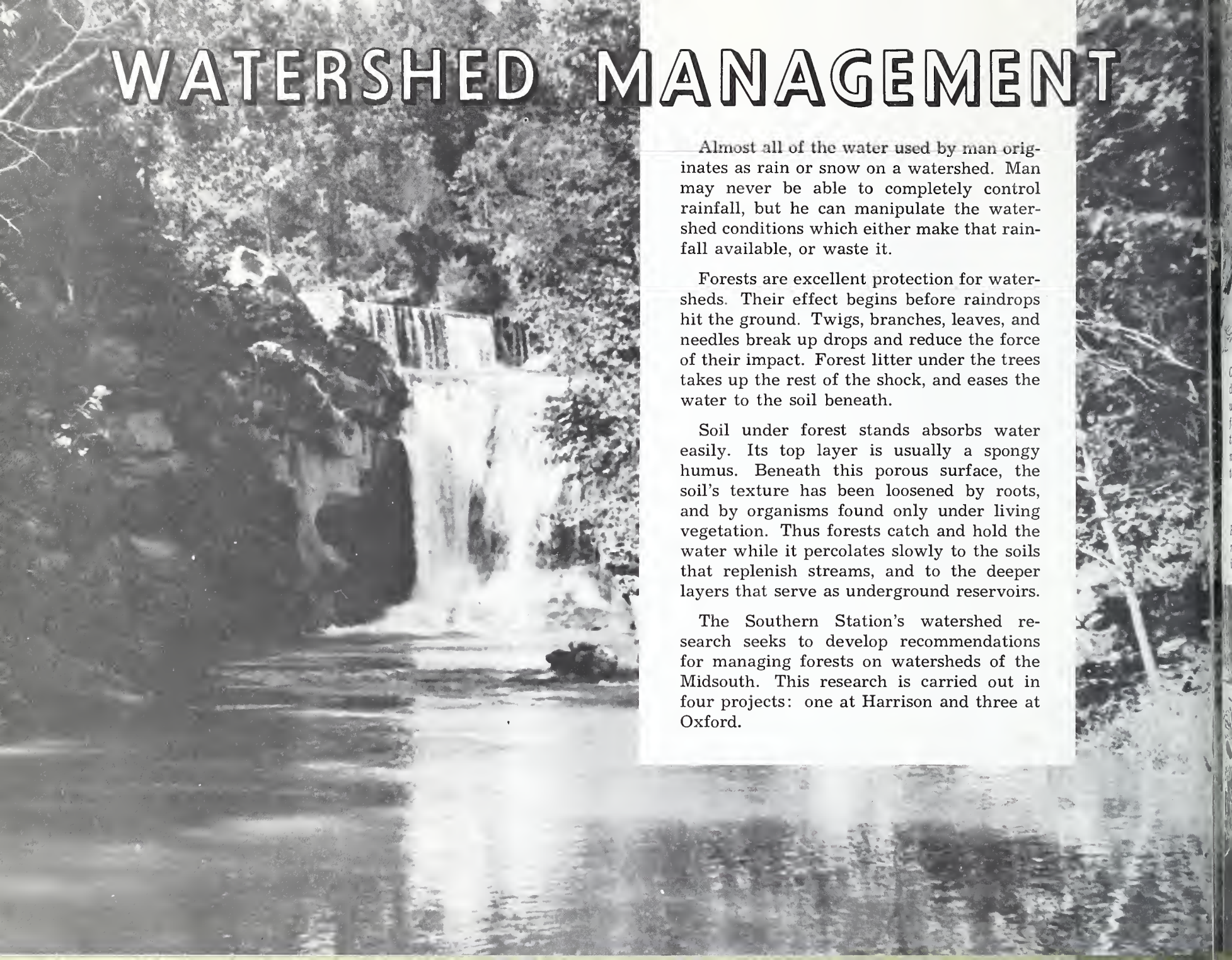
The Institute of Forest Genetics was established at Gulfport in 1955 to determine the role of inheritance in controlling the desirable characteristics in forest trees. In December 1960, the Institute moved into the new laboratory-office building it shares with the Wood Products Insect Laboratory and the Forest and Wood Products Disease Laboratory. The building has modern facilities, and the latest instruments available for the types of research planned. The space and equipment in the new laboratory permit increased effort in established lines of research, and the broadening out into other important phases of genetics, physiology, and pathology.

Controlled pollination—one of the older breeding techniques—occupies a great portion of the geneticists' time and effort; well over 160,000 pedigreed seedlings are in plantations. Comparison of the characteristics of these seedlings with those of their parents will shed light on the role of inheritance.

Future research at Gulfport will lead to the development of hardwoods and pines which are superior in many ways to run-of-the-woods stock. Such trees may have increased growth rate, higher quality wood, resistance to diseases and insects, grow well outside their natural ranges, and utilize water and soil nutrients fully.

Paper chromatography is one of the techniques for identifying organic compounds in plant tissue. Geneticists hope to gain understanding of plant growth and the factors controlling growth.

WATERSHED MANAGEMENT



Almost all of the water used by man originates as rain or snow on a watershed. Man may never be able to completely control rainfall, but he can manipulate the watershed conditions which either make that rainfall available, or waste it.

Forests are excellent protection for watersheds. Their effect begins before raindrops hit the ground. Twigs, branches, leaves, and needles break up drops and reduce the force of their impact. Forest litter under the trees takes up the rest of the shock, and eases the water to the soil beneath.

Soil under forest stands absorbs water easily. Its top layer is usually a spongy humus. Beneath this porous surface, the soil's texture has been loosened by roots, and by organisms found only under living vegetation. Thus forests catch and hold the water while it percolates slowly to the soils that replenish streams, and to the deeper layers that serve as underground reservoirs.

The Southern Station's watershed research seeks to develop recommendations for managing forests on watersheds of the Midsouth. This research is carried out in four projects: one at Harrison and three at Oxford.

On most streams, in most seasons, flow depends on the kind of forest on the watersheds, and how well the forest floor absorbs rainfall for storage in the soil. Thin, rocky soils of the mountains present special problems to watershed managers.

Flumes installed on study watersheds record the flow of runoff. Sediment is sampled by the revolving wheel.

WATER TIMING

Harrison, Arkansas

Mountain watersheds are special management problems, because slopes are steep and soils are shallow. Heavy rains readily turn into floods. The sparse soil stores so little water that streams go dry when rains fail. Forest cover adds extra storage in litter layers, keeps soils permeable, and helps hold water for dry weather streamflow. The kind and amount of forest determines how well it does the job.

The research project at Harrison deals with watersheds in the Ouachita Mountains and Ozark Highlands of Arkansas and Missouri. The prime objective is stabilization of flow in small streams to assure an acceptable year-round yield of good water.

Research is under way to:

Study the depth and character of mountain soils, and learn how fast they take in and transmit water, and how much water they can hold.

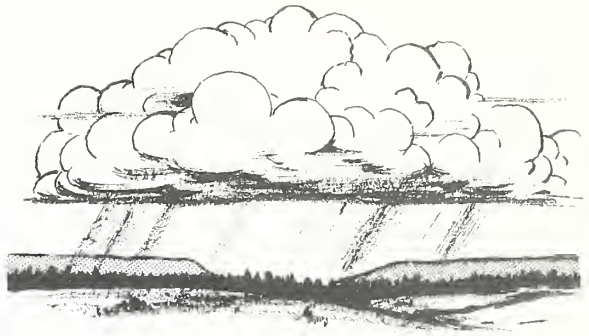
Determine how tree roots and surface litter affect absorption, storage, and erosion.

Find out how fast trees use water from the soil, and how much this changes as old trees are cut and replaced with seedlings.

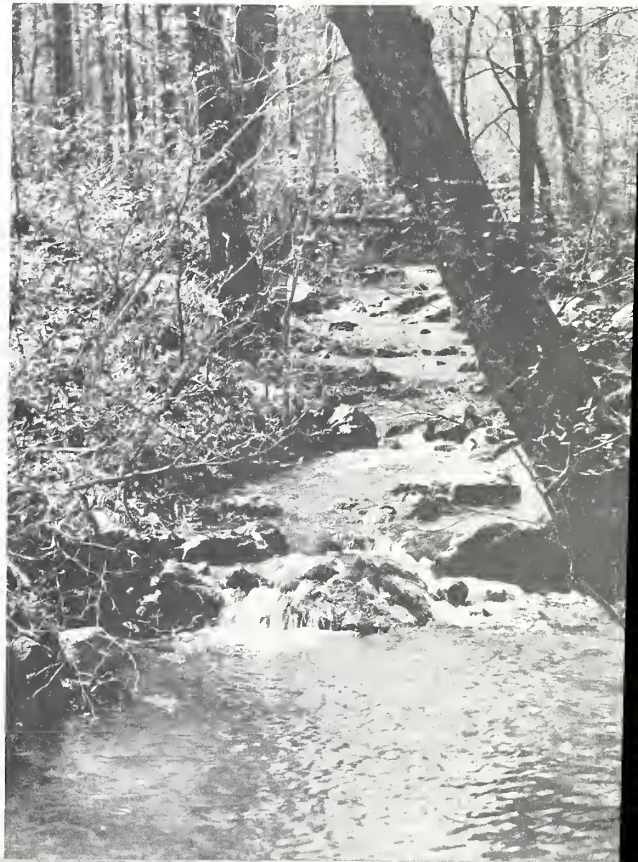
Test various cutting methods to determine their effects on streamflow.

Investigate water behavior as it is influenced by soil character and vegetation.

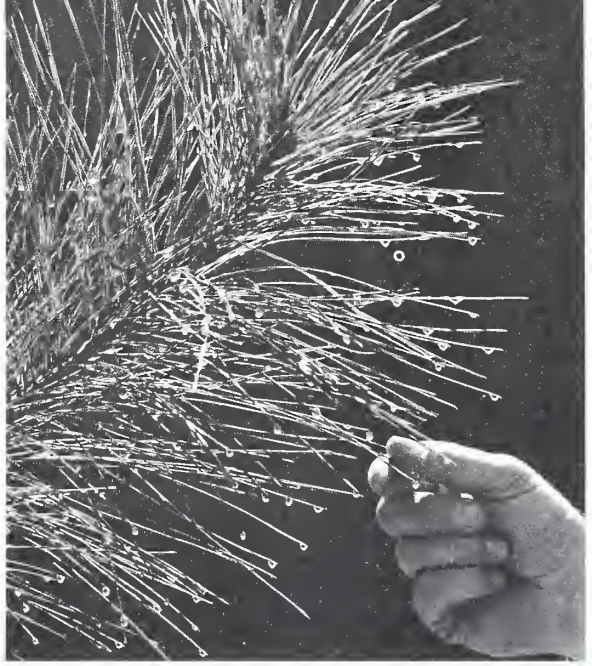
Headquarters offices and laboratories for the project are in Harrison. Field studies are on the Alum Creek Experimental Forest near Hot Springs, the Koen Experimental Forest near Harrison, and at plots supplied by landowners and industries throughout the mountain areas.



Dependable flows of clear water from watersheds protected by forest cover are needed for irrigation, domestic use, and industry.



Soil erodes from unprotected watersheds, clogging drainageways, muddying streams, and burying fertile bottom lands.



Leaves and needles of trees slow erosion by easing the impact of raindrops on the soil.

Forest litter keeps the soil in place. Researchers study the effects on litter accumulation of the kinds, spacing, and harvesting of trees.

COASTAL-PLAIN HYDROLOGY

Oxford, Mississippi

Most Coastal Plain soils are deep, and have an immense capacity for holding water. They can take in and store rain during the wet seasons, and release water into the streams during dry weather, or add it to ground-water supplies. Practically all of the usable fresh water in the South passes through these soils. The cover on these lands, especially that provided by forests, determines how effectively this storage is used.

Hydrology research is one of the three projects headquartered at Oxford. It investigates the effects of forests on streamflow and groundwater recharge. This is the first Forest Service research of its kind in the Coastal Plain, where already many communities are feeling the first hints of water shortages.

Questions like these must be answered:

How do geology and soils affect groundwater? Where are the areas of recharge for streamflow and groundwater reservoirs?

What types of cover are most efficient in getting water into the soil? How does cover type relate to different soils?

How can soil permeability be increased by forest growth? Where are such increases needed most critically, and how do we start attaining them?

How much soil moisture do trees use? What stand density is best for watersheds?

How much of the rainfall is intercepted by tree crowns?

Temporary brush dams trap sediment in small gullies. African lovegrass is planted to stabilize the soil until planted pines can become established.

WATERSHED REHABILITATION

Oxford, Mississippi

The hill areas of north Mississippi and west Tennessee contain some of the worst erosion in the South. Here, after more than 100 years of row cropping on erosive sites, bare, jagged wastelands offer grim evidence of the history of misuse. Sediment picked up and carried downstream by excessive runoff has clogged drainageways, buried fertile bottom lands, and filled reservoirs.

The watershed rehabilitation project is headquartered at Oxford, Mississippi, in the heart of this damaged area. Its main goal is to find ways of reducing storm runoff, erosion, and sedimentation.

In past studies of soils-plant-water relationships, Oxford researchers found that loblolly pine, when well established, will adequately stabilize severely eroded sites. They have also learned ways to improve survival of planted trees in many situations. But for some of the most difficult planting sites, still better methods are needed.

MANAGEMENT OF EROSIVE WATERSHEDS

Oxford, Mississippi

Some of the once-eroding lands in north Mississippi and western Tennessee are supporting their first merchantable crop in decades—trees. These gully lands have been stabilized with pines, and many stands have reached pulpwood size.

Since the major function of these stands was—and still is—to protect watersheds and stop erosion, the question is: Should they be harvested? If so, how, and how much?

To guide landowners in removing timber without danger of starting new erosion cycles, researchers at Oxford are conducting studies to determine:

How partial cutting affects the accumulation of protective litter under stands.

How to reproduce stands without exposing soil to erosion.

Whether prescribed burning can be used in managing timber on erosive sites.

Whether forage can be grazed without damage to such sites.

Timber management recommendations suited to the small landowner's skills, time, and equipment.

An actively eroding gully in former cropland has been completely stabilized for more than 10 years by loblolly pine planted 25 years ago.

RANGE MANAGEMENT

Southern forests yield not only great quantities of wood but also much usable forage. Owners of commercial timberland are becoming increasingly conscious of the benefits of good wood utilization practices; many are not yet fully aware of what good forage utilization can add to total returns from their land.

Worthwhile amounts of forage grow on vast acreages of the South's forest land. Cutover pine lands and areas newly regenerated often yield a ton or more of grass per acre. The custom has long been to accept low livestock production on free range, but research has now shown the way to more profitable forage use. Range specialists at Alexandria have developed systems of supplemental feeding, conservative stocking, and sound herd management which doubled beef yields and gross income.

However, the current information on forage and cattle management applies mainly to understocked stands. Ahead is the more formidable task of developing management systems for utilizing forage throughout a complete timber rotation.

SOUTHERN PINE CATTLE RANGES

Alexandria, Louisiana

Forest range research in the South began in 1943 to evaluate the forage resource and to discover how forage growth and nutritive value are influenced by soils, weather, timber cutting, fire, grazing, and forest type and density. These studies revealed that native forage is poor in protein during some seasons, and that its phosphorous content stays below the minimum requirements of cattle year-long. However, it supplies adequate amounts of other necessary nutrients.

Future studies of the project will fall into the following groups:

Timber-Forage Relations and Management. These studies will seek to learn how forage production is affected by timber growth and timber management operations.

Ecology and Physiology. More information is needed about desirable forage plants —how they are distributed in plant communities, and how they are affected by soils, weather, and competition with other vegetation.

Cattle Management and Grazing Influences. Researchers will investigate the rate, season, and kind of supplements needed for optimum beef yields from native forage. They will also study effects of grazing on regeneration and growth of pines and hardwoods, and on soils.

Native forage in southern pine cattle ranges is deficient in nutritive value during some seasons.

Supplemental feeding can make southern pine cattle ranges profitable.

Overgrazing is detrimental to range, forests, and livestock.

WILDLIFE MANAGEMENT

Food—the search for it, or the eating of it—dominates the lives of most wild birds and animals. Shelter and water are important also, but the success of a species is largely determined by the kind and amount of food available during the entire year.

More than one-half million deer, more than 150,000 turkey, and untold numbers of squirrel and quail depend on Midsouth forests for food and cover; these forests could support many times the current populations. But trouble arises when the numbers of game birds and animals are out of balance with the habitat. With too little game, sportsmen are dissatisfied and much of the available forage and mast goes to waste. Too high populations lead to overuse of plants, excessive loss of game through undernourishment, and heavy damage to young trees.

Wildlife research is concentrated in the loblolly-shortleaf pine-hardwood forest types of the Coastal Plain, where potential forest-game conflicts are greatest. Other installations, in the mountains and in highly productive bottom-land hardwood areas, will contribute to an understanding of fundamental relationships between game and its habitat.

Deer depend heavily upon browse plants, such as the flowering dogwood.

Game habitat is improved when openings are made by harvest of timber.

Relationships between deer and their forest environment are studied in large fenced tracts.

WILDLIFE HABITAT IN SOUTHERN FORESTS

Nacogdoches, Texas

Forests and wildlife generally occupy the same land. Whoever controls the woodlands controls the habitat of the birds and animals. Timbermen and wildlife men, understanding each other's needs and aims, can develop balanced management that will result in maximum yields of both wood products and game—without one interfering with the other.

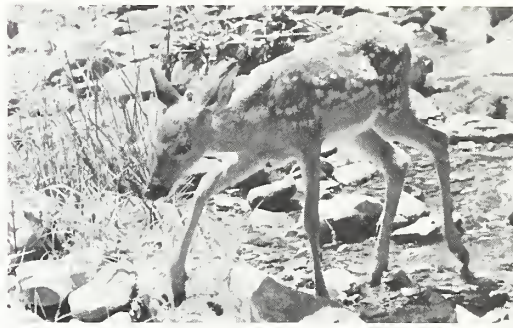
The Station's wildlife habitat research project is headquartered at Nacogdoches with field installations near Mountain View, Arkansas, and Winnfield, Louisiana. Some investigations are conducted at Stoneville.

At Nacogdoches, two 150-acre enclosures, one with and one without mast-producing trees, will be used to compare the importance of acorns and browse in deer diet.

Near Winnfield, three 160-acre enclosures are stocked with 2, 4, and 8 deer each, the aim being to find the effects of various intensities of browsing on animal health and forage yields.

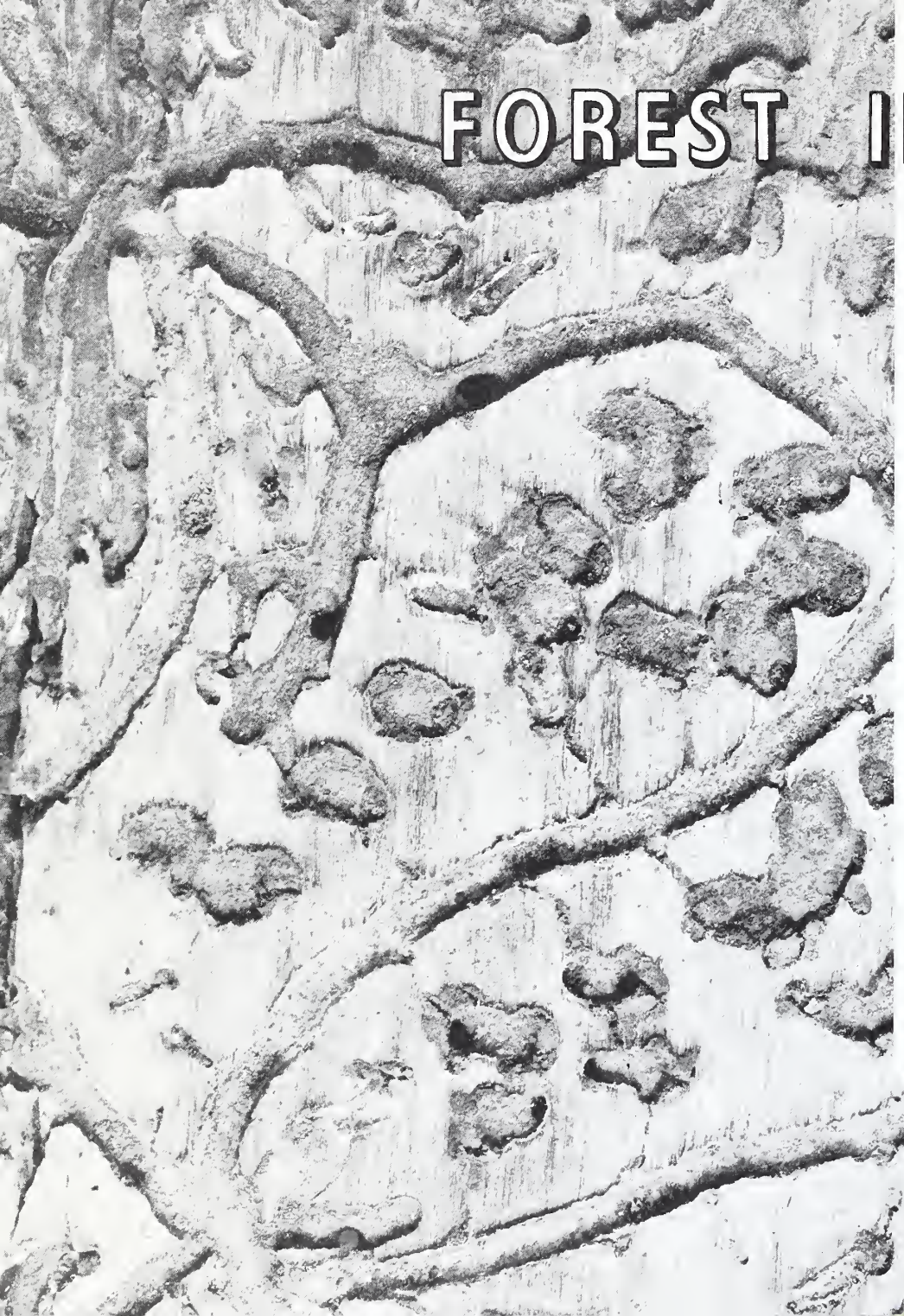
Near Mountain View, researchers removed all deer from two square-mile enclosures in typical second-growth shortleaf pine-hardwood forests, and put back into the enclosures known numbers of animals. The herds' welfare will be traced from the original conditions of habitat through the changes brought about by thinning and harvesting.

At Nacogdoches and plots throughout the South, game food plants will be studied. Their soil and water requirements, their times of flowering, growth, and seeding will be recorded.



Game habitat research must determine the needs of very young animals as well as those of adults.

Special sampling devices help measure the crops of acorns produced under various forest conditions.



FOREST INSECTS

Many insects feed upon unprotected wood. They tunnel into the trunks of living trees, especially the hardwoods, lowering the quality of products. They bore into wood that is stored while it awaits manufacture. They gnaw lumber, buildings, paper, and furniture. The wood products pests alone cost Americans about $300 million each year.

But even more destructive are the insects that attack the leaves, twigs, roots, and inner bark of forest trees. It is almost impossible to estimate how much they reduce growth potential, but they cause a tremendous loss in southern forests each year.

Forest entomologists of the Southern Station are concerned with many types of insects. A project dealing with insect enemies of southern pines is located at Alexandria. Insects that attack living hardwood trees are studied at the Southern Hardwoods Laboratory at Stoneville. The Wood Products Insect Laboratory at Gulfport is continuing well-established research programs on termites and other insects that damage wood in storage or in use.

INSECT ENEMIES OF WOOD

Gulfport, Mississippi

Worker termites—the ones that do the damage—are tiny, blind, soft, defenseless creatures that look like small grayish-white ants. The only fierce thing about them is their appetite for wood—usually wood that humans thoughtfully provide in buildings.

Termite controls developed at Gulfport, based on insecticide-treated soils beneath buildings, give 100-percent protection for at least 15 years.

Gulfport researchers have devised methods of protecting stored rough products such as pulpwood, saw logs, and unfinished lumber from the attacks of bark beetles, wood borers, and ambrosia beetles. Current studies include the powder-post beetle and drywood termites.

Major field installations for the project's research are at the Harrison Experimental Forest. The project shares with the Institute of Forest Genetics and the Forest and Wood Products Disease Laboratory the excellent office and laboratory facilities dedicated in Gulfport in 1960.

Subterranean termites cause millions of dollars in damage each year to wood in unprotected buildings.

Tests at Gulfport use simulated siding panels to test the value of pressure-treated wood in protecting wood above it from termites.

Powder-post beetles attack stored wood and wood in use. Current studies seek controls for these and similar pests.

Male (above) and female adults of the cottonwood borer. About natural size.

INSECT ENEMIES OF HARDWOOD TREES

Stoneville, Mississippi

Insects that bore into the trunks or tunnel into bark of hardwood trees are of special concern to southern hardwood lumbermen. These borers and scarrers infest and degrade what would otherwise have been high-quality wood. Other types of insects, such as the cottonwood twig borer, stunt and deform trees. Defoliating insects, such as the forest tent caterpillar, each year eat the leaves from millions of bottom-land hardwoods. Successive defoliations slow the growth of these trees, and sometimes kill them.

Research is conducted at the hardwood-insect project at Stoneville on the biology, ecology, and economic impact of these insects with the ultimate aim of controlling their depredations.

Larva of a cottonwood borer in the root of a 4-year-old tree. Borer larvae often attack young trees at or below groundline, causing saplings to break off.

Borers that attack living hardwood trees cause loss through degrade. Such defects often escape discovery until the log is sawed into lumber.

Forest tent caterpillar eggs: upper mass contains larvae; lower one, empty egg cases.

Young adults of the southern pine beetle, in pupal cells. This insect is considered to be the most destructive forest insect in the South.

INSECT ENEMIES OF PINES

Alexandria, Louisiana

While hardwood insects seldom kill their victims outright, just *one* attack by the southern pine beetle can kill a single tree, a group of trees, or (during epidemics) pines on thousands of acres.

Pine bark beetles, taken together, are the most destructive insects in the southern pinery. Each year they ravage millions of board feet of sawtimber and large volumes of pulpwood. The southern pine beetle causes the most spectacular damage of the group because it breaks out in wildly destructive epidemics. The black turpentine beetle and three species of *Ips* engraver beetles continue a widely dispersed, less flamboyant activity which probably destroys more timber over the years than does the southern pine beetle.

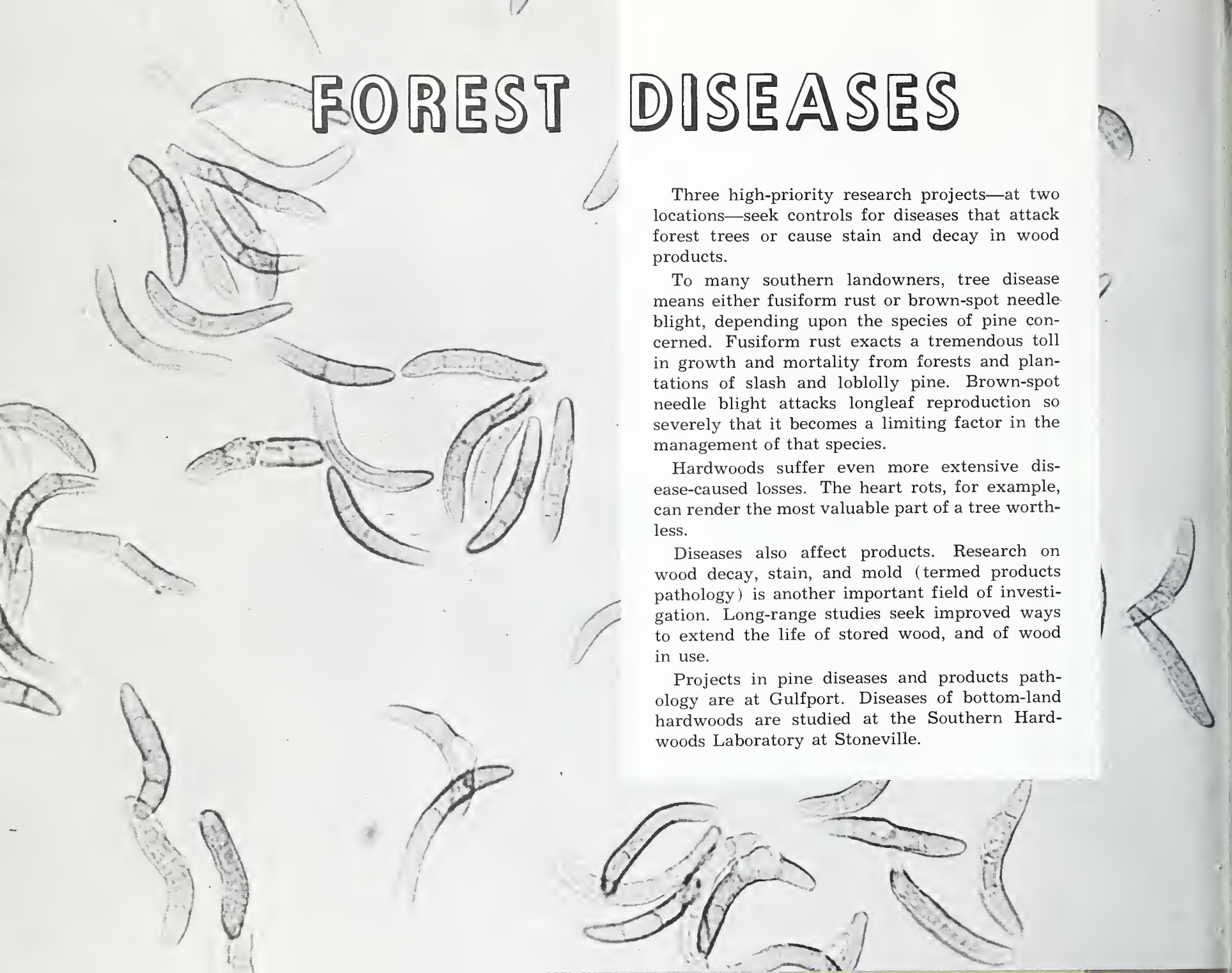
Known controls for bark beetles are expensive and not entirely effective. One of the major endeavors of the insect research project at Alexandria is to develop cheaper and more positive ways of protecting the forests from these pests.

Other destructive pine insects include the sawflies, tip moths, weevils, and leaf-cutting ants. These pests are especially destructive in young, even-aged plantations. Techniques for protecting seedlings and mature trees against these common enemies are subjects for future research at Alexandria.

Town ants can strip a pine seedling in a few hours. In this sequence (taken in the laboratory), the ants can be seen at work.

Female sawfly deposits eggs in slits she cuts in pine needles. Larvae hatch and feed on the needles.

FOREST DISEASES



Three high-priority research projects—at two locations—seek controls for diseases that attack forest trees or cause stain and decay in wood products.

To many southern landowners, tree disease means either fusiform rust or brown-spot needle blight, depending upon the species of pine concerned. Fusiform rust exacts a tremendous toll in growth and mortality from forests and plantations of slash and loblolly pine. Brown-spot needle blight attacks longleaf reproduction so severely that it becomes a limiting factor in the management of that species.

Hardwoods suffer even more extensive disease-caused losses. The heart rots, for example, can render the most valuable part of a tree worthless.

Diseases also affect products. Research on wood decay, stain, and mold (termed products pathology) is another important field of investigation. Long-range studies seek improved ways to extend the life of stored wood, and of wood in use.

Projects in pine diseases and products pathology are at Gulfport. Diseases of bottom-land hardwoods are studied at the Southern Hardwoods Laboratory at Stoneville.

DISEASES OF BOTTOM-LAND HARDWOODS

Stoneville, Mississippi

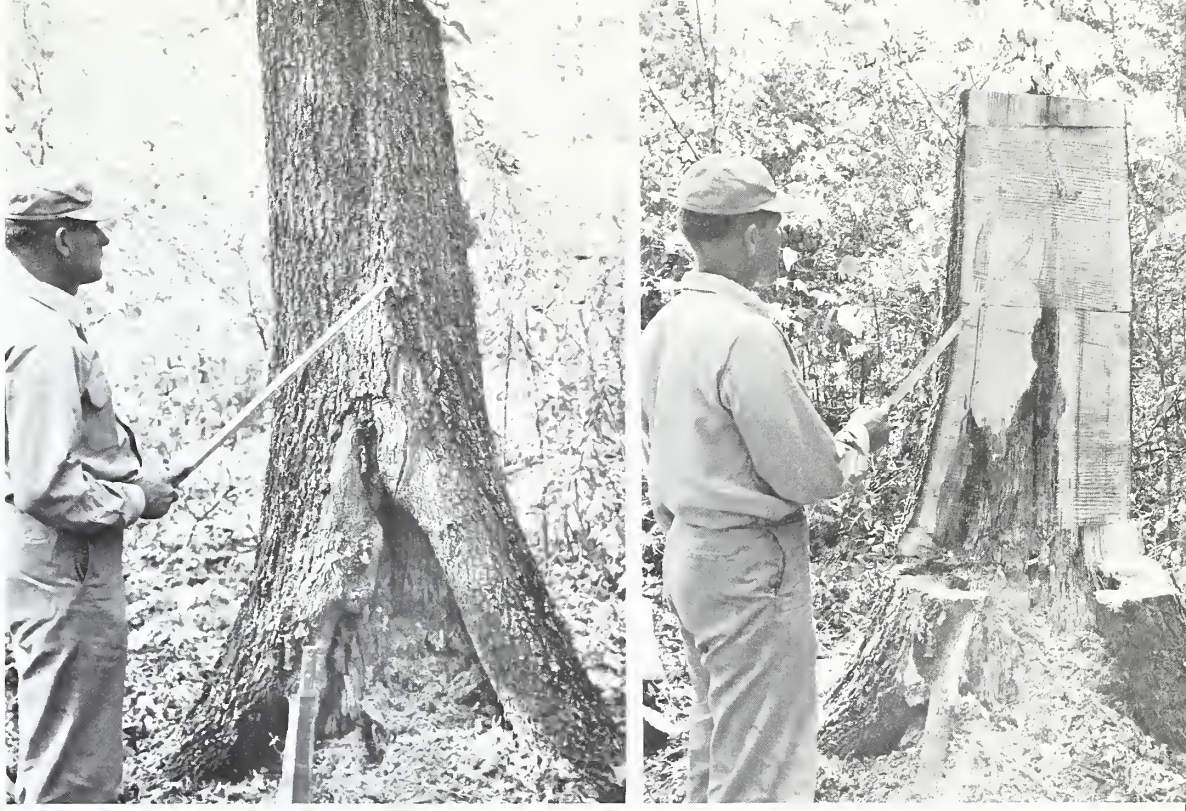
More volume is lost in bottom-land hardwoods from heart rots than from any other factor. Most heart rot results from fungi entering the tree through fire scars, so could be prevented by keeping fires out of the woods. This is difficult to do throughout the entire rotation of a stand—therefore, some firewounding and resulting decay is almost inevitable.

As an aid to the forester in determining when a wounded tree should be salvaged, pathologists determine how fast decay develops in different trees, and how the amount of decay can be estimated from external signs.

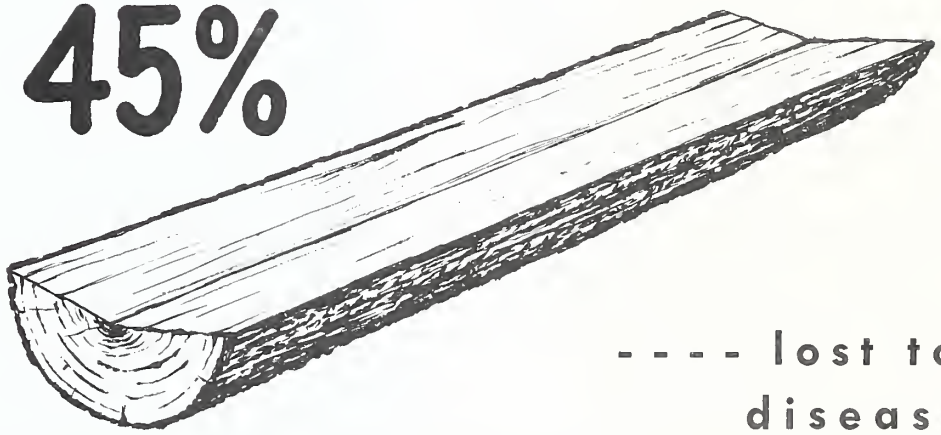
Hardwoods also are affected by many other diseases such as leaf spots, cankers, wilts, and root rots. Much research remains to determine the importance of these diseases in terms of mortality, growth loss, and wood degrade and how much disease occurrence is influenced by site, stand, and weather conditions.

Work also includes studies of the fungus-tree-root associations called mycorrhizae. Scientists need to learn what fungi are involved, and if they are always beneficial.,

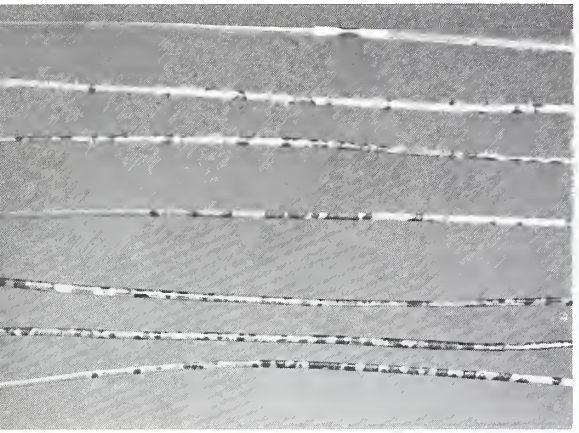
Until completion of the Southern Hardwoods Laboratory at Stoneville in 1962, hardwood pathology research was impeded by lack of laboratories, equipment, and greenhouses. Now, scientists of the hardwood-disease research project there can explore the biologies of the organisms that cause tree diseases.



Heart rot takes a terrific yearly toll of southern bottom-land hardwoods. Entry is usually through basal wounds, such as those caused by fire.



DISEASES OF PINES--IN FORESTS AND NURSERIES



Typical lesions of brown-spot needle blight on longleaf pine. The disease is often largely responsible for longleaf's slow early height growth.

Gulfport, Mississippi

Fusiform rust and brown-spot needle blight account for most of the enormous, perpetual, disease-caused drain on the southern pinery. The main emphasis of the Southern Station's pine disease research is on the biologies of these two despoilers; the project is located at the Forest and Wood Products Disease Laboratory, Gulfport.

Laboratory and greenhouse studies probe the life histories of the disease organisms. Scientists also want to find out exactly what these pathogens do to the plant—to its life functions, its tissues, and its individual cells.

In recent years, southern forest nurseries produced as many as 3 billion seedlings annually—almost 80 percent of the country's total. Yet not long ago, the nurseries were almost out of business because of a disease called black root rot. Research found the answer in soil fumigation.

Future research will benefit from the excellent office, laboratory, and greenhouse facilities now in Gulfport. This building, dedicated in 1960, provides the space and equipment for the asepsis required to permit isolation, identification, and study of disease organisms.

Fusiform rust is the most serious disease of slash pine, sometimes infecting entire plantations. It attacks both seedlings (left) and larger trees.

At one time, black root rot disease almost forced the closing of the South's forest nurseries. Research developed a remedy; nurseries continued to produce floods of seedlings for reforestation.

WOOD DECAY

Gulfport, Mississippi

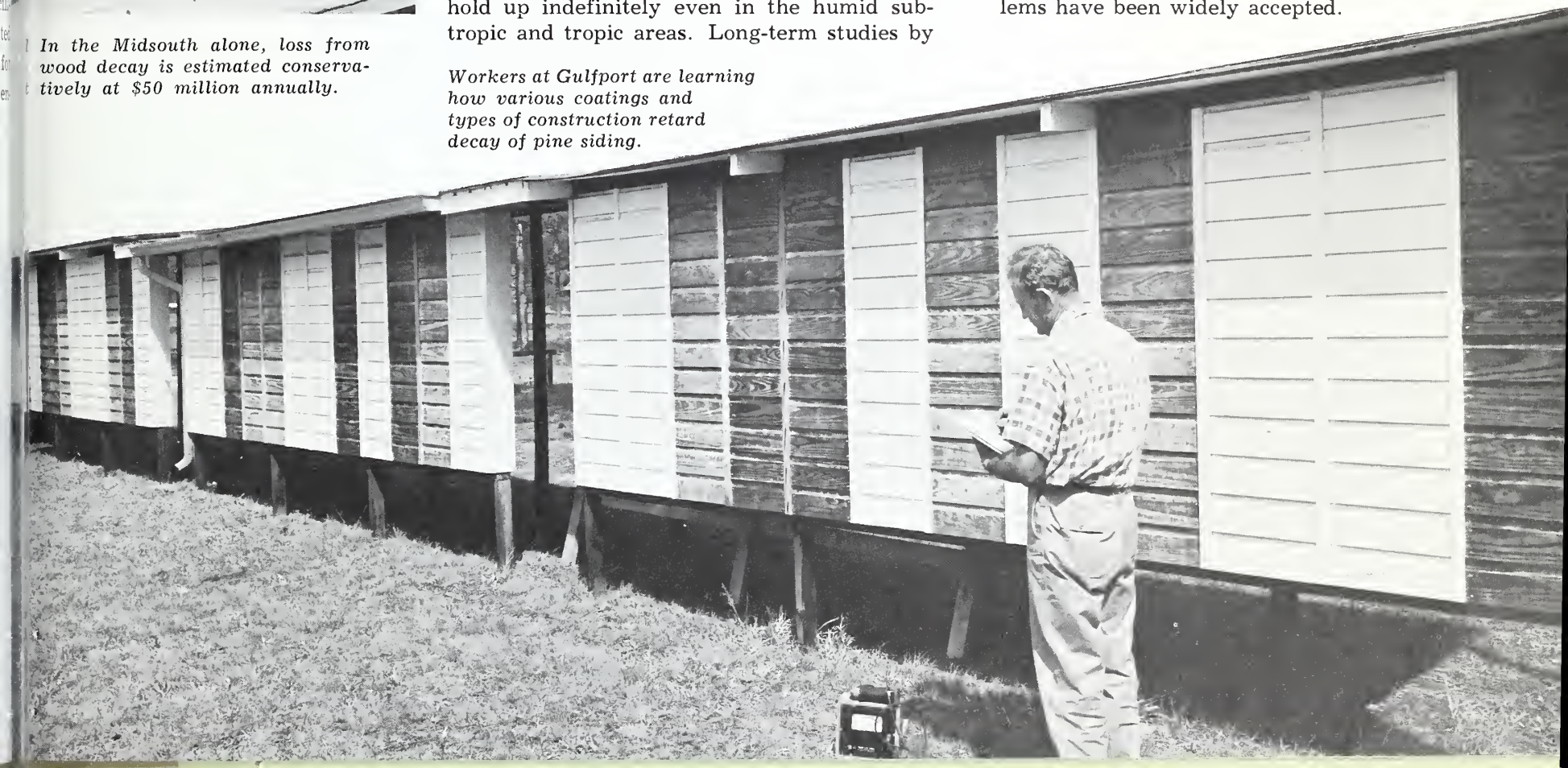
Most wood products from southern forests have no natural resistance to fungus attack. From the moment a tree is cut and becomes a "product"—log, bolt, post, or piling—it is subject to attack by fungi that cause stain, mold, and decay. The organisms keep up their attack while the wood is hauled, stored, manufactured, and used—unless precautions are taken.

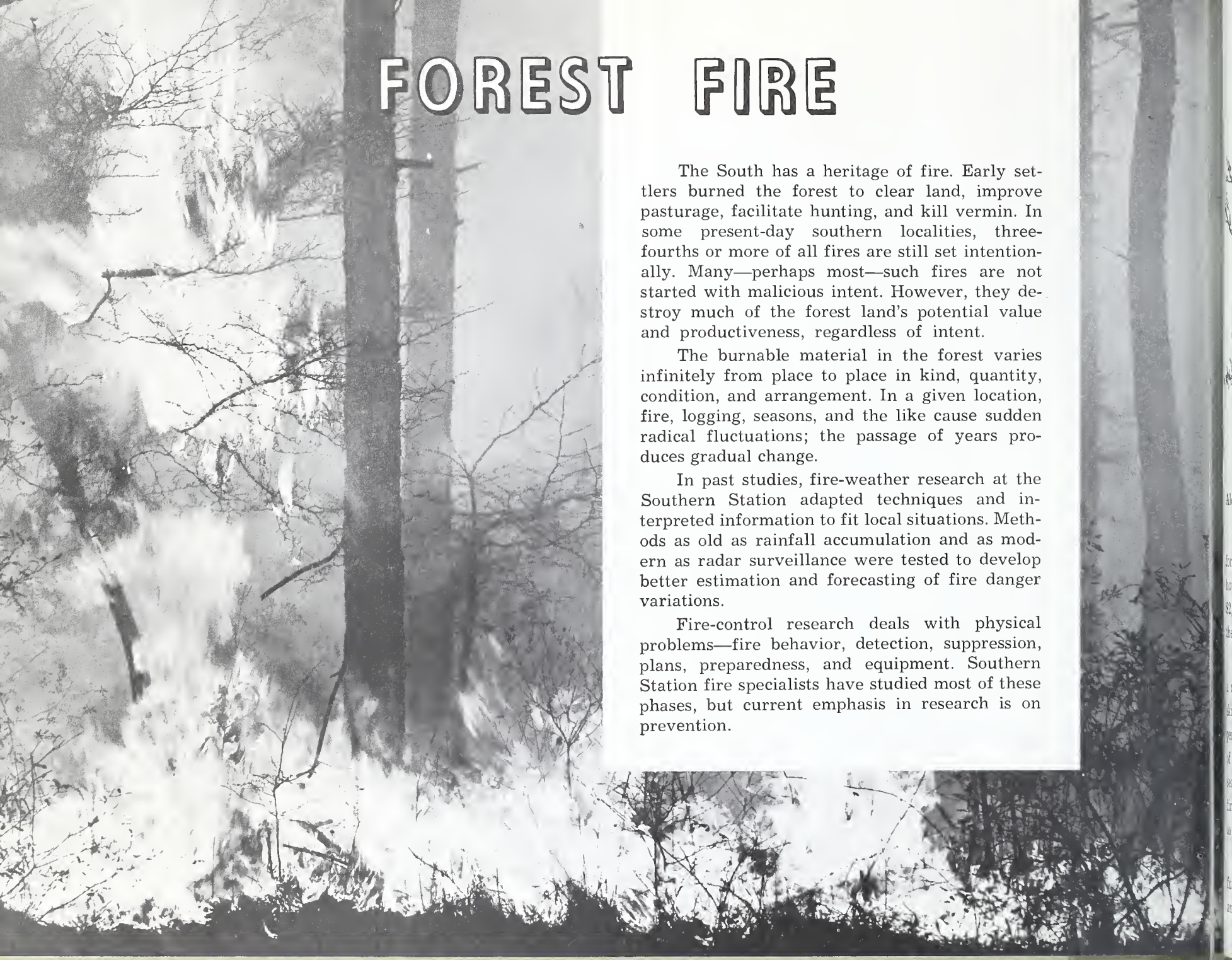
Fungi that damage wood products require moisture to exist. If wood can be shielded from moisture either through good building design or by water-repellent preservatives, it will hold up indefinitely even in the humid subtropic and tropic areas. Long-term studies by the wood protection project at Gulfport are determining how rainwetting of siding, trim, and other exterior woodwork is related to wall design, siding pattern, roof overhang, and type of finish.

Forest pathologists at Gulfport devise improved techniques for on-the-job application of fungicides and water repellents. They have proposed methods, now in worldwide use, of protecting lumber during air seasoning. Their recommendations for building designs to reduce decay and other moisture-induced problems have been widely accepted.

In the Midsouth alone, loss from wood decay is estimated conservatively at $50 million annually.

Workers at Gulfport are learning how various coatings and types of construction retard decay of pine siding.





FOREST FIRE

The South has a heritage of fire. Early settlers burned the forest to clear land, improve pasturage, facilitate hunting, and kill vermin. In some present-day southern localities, three-fourths or more of all fires are still set intentionally. Many—perhaps most—such fires are not started with malicious intent. However, they destroy much of the forest land's potential value and productiveness, regardless of intent.

The burnable material in the forest varies infinitely from place to place in kind, quantity, condition, and arrangement. In a given location, fire, logging, seasons, and the like cause sudden radical fluctuations; the passage of years produces gradual change.

In past studies, fire-weather research at the Southern Station adapted techniques and interpreted information to fit local situations. Methods as old as rainfall accumulation and as modern as radar surveillance were tested to develop better estimation and forecasting of fire danger variations.

Fire-control research deals with physical problems—fire behavior, detection, suppression, plans, preparedness, and equipment. Southern Station fire specialists have studied most of these phases, but current emphasis in research is on prevention.

The slow match is a favorite device of arsonists. In the time it takes for the cigarette to burn down to the matches, the woods-burner can get away.

FIRE PREVENTION IN SOUTHERN FORESTS

Alexandria, Louisiana

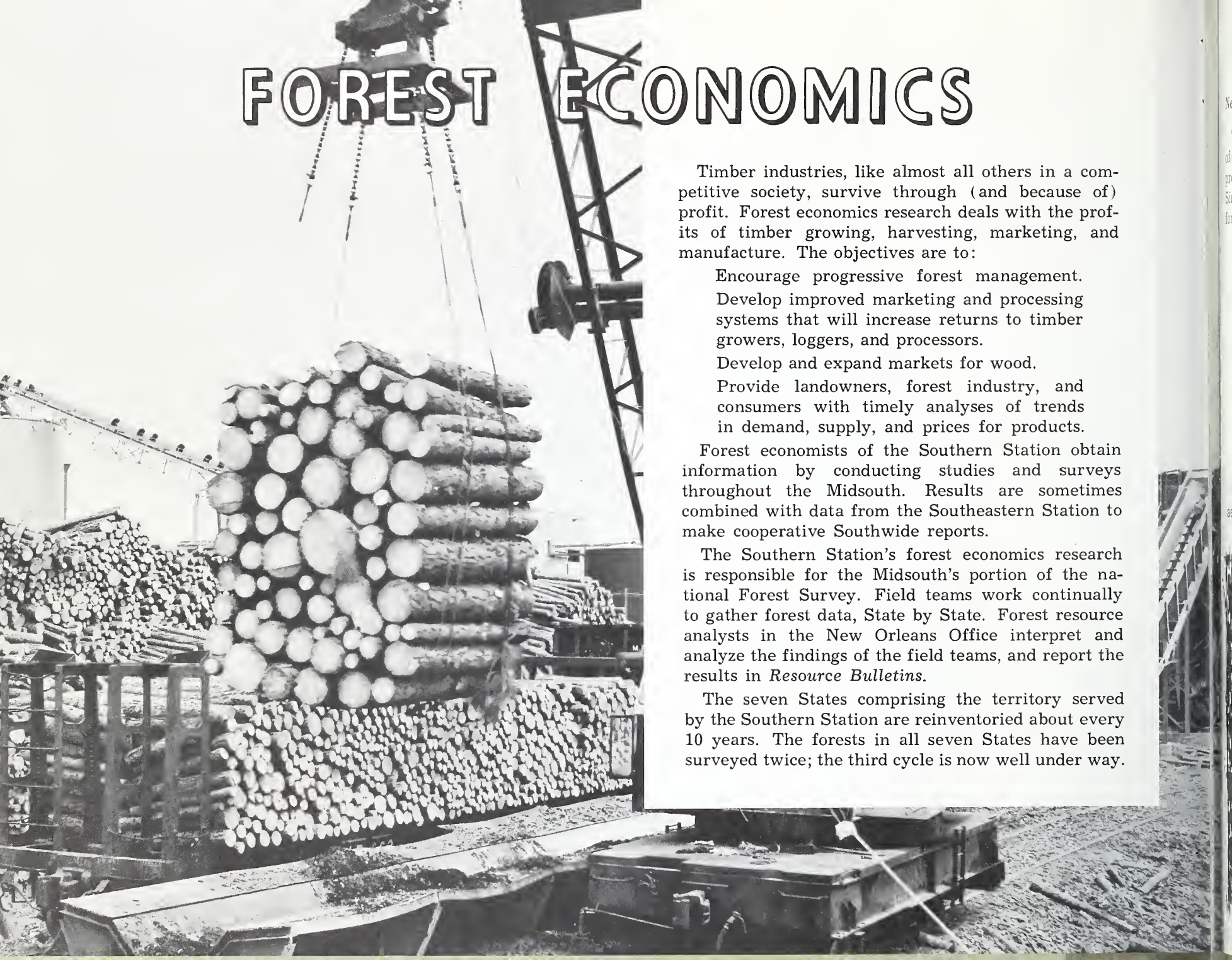
In a bad fire year (such as 1962), the South has an average of eight forest fires for every hour of the day and night, all year long. For every hour of the year, 335 acres of forest burn and fire-fighting costs average $2,400. People start more than nine-tenths of the fires—about half of them deliberately.

Since most forest fires are man-caused, prevention becomes chiefly a matter of working with people. Fire prevention research utilizes the skills of trained social scientists—personnel from State colleges and experiment stations who have well-established contacts and a long history of success in dealing with rural people. The aim of this cooperative research is to find out why people believe and act as they do in regard to fire, and how they may be induced to adopt behavior that will result in fewer fires.

Study of past experience frequently shows how to do better in the future. Fire researchers analyze operational records of protection agencies and attempt to show where and how improvement can be made.

Fire prevention starts with people. Researchers interview residents in high-incidence areas to learn their attitude toward woods fires.

FOREST ECONOMICS



Timber industries, like almost all others in a competitive society, survive through (and because of) profit. Forest economics research deals with the profits of timber growing, harvesting, marketing, and manufacture. The objectives are to:

Encourage progressive forest management.

Develop improved marketing and processing systems that will increase returns to timber growers, loggers, and processors.

Develop and expand markets for wood.

Provide landowners, forest industry, and consumers with timely analyses of trends in demand, supply, and prices for products.

Forest economists of the Southern Station obtain information by conducting studies and surveys throughout the Midsouth. Results are sometimes combined with data from the Southeastern Station to make cooperative Southwide reports.

The Southern Station's forest economics research is responsible for the Midsouth's portion of the national Forest Survey. Field teams work continually to gather forest data, State by State. Forest resource analysts in the New Orleans Office interpret and analyze the findings of the field teams, and report the results in *Resource Bulletins*.

The seven States comprising the territory served by the Southern Station are reinventoried about every 10 years. The forests in all seven States have been surveyed twice; the third cycle is now well under way.

FOREST SURVEY

New Orleans

The Forest Survey, or the "national survey of forest resources," is this country's only comprehensive source of timber resource facts. Since 1930, the Survey has been obtaining information on:

The area and condition of forest land.

The volume, species, quality, and location of standing timber.

Ownership of forest land and timber.

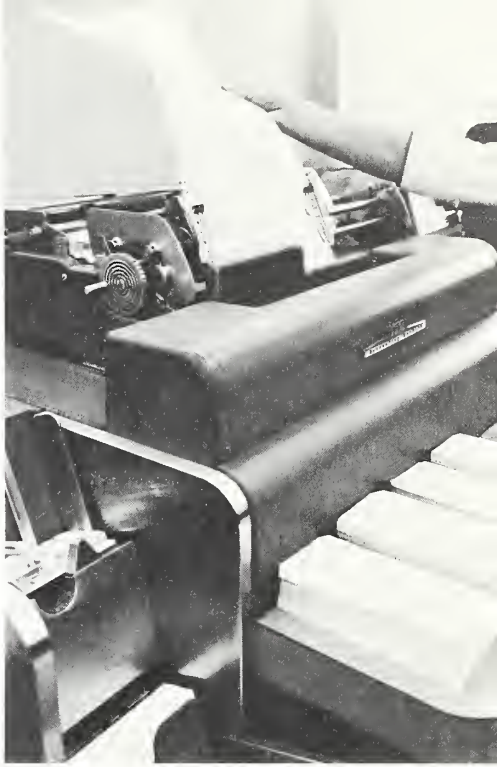
Rates of tree growth and mortality.

Timber cut for lumber, pulp, and other purposes.

Present and predicted consumption of various timber products.

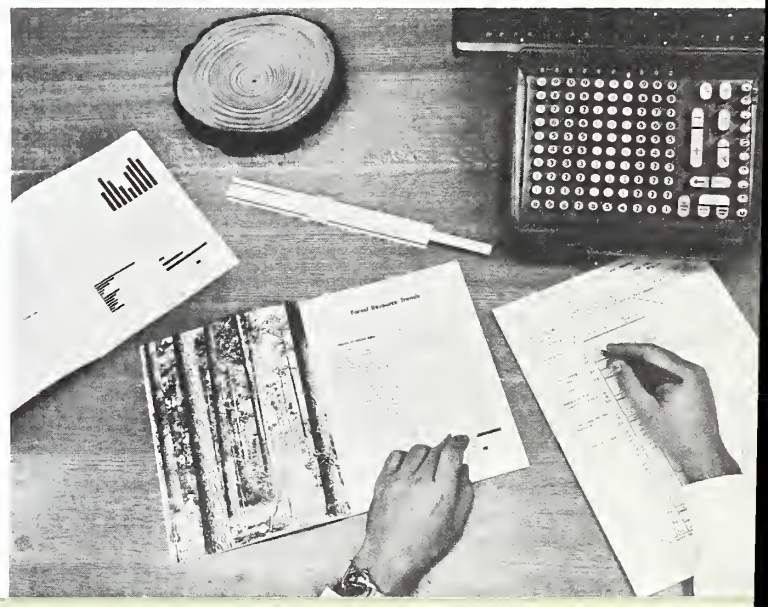
Today's inventory procedures make use of aerial photos; interpreters first identify forested land and determine its extent. Then they locate on the photos the intersections of grid lines, spaced 3 miles apart in north-south and east-west directions. Field crews travel to each point that falls on forested land, and gather the required data. They then send their information to the New Orleans Office, where it is placed on punch cards for sorting and compilation by machine.

Forest Survey information is utilized in many important ways. Wood-using industries regard these timber resource facts as essential business statistics on production and markets. They use them in deciding the location of new mills, expanding existing ones, planning wood procurement, and setting long-term management policies for company timberlands. In the South, the vast expansion of the pulp and paper industries was guided by Survey findings.



Every year, Forest Survey reports are studied by thousands of foresters, industrialists, landowners, and public administrators.

Forest data are gathered by survey teams in the field; the information is processed and analyzed by resource specialists in New Orleans.



TIMBER SUPPLY AND DEMAND POTENTIALS

New Orleans

An almost unbeatable way to encourage landowners to practice good forestry is to open constant, lucrative markets for their wood products. One way of doing this is through wood industries that are operating efficiently and turning out products that find good markets because they are more attractive in price and quality than competing materials. The finding of better and more proficient procedures is an important phase of economics research.

Opportunities for improved efficiencies also lie in utilization of logging and manufacturing wastes. At present, unused logging and milling residues in the Midsouth exceed the annual growth from about 10 million acres of forest. About 15 million cords of wood are locked up in cull trees. An astounding 50 billion board feet of the Midsouth's hardwood timber has little value, being either low-grade or of undesirable species. Research is directed toward developing markets for these problem materials.

Economists also prepare and publish analyses of the trends affecting the use of wood and its competitive materials. Such studies help forest industries adjust to the changes in supply and demand, and to anticipate future markets.

Small ownerships. Farmers, businessmen, professional people, housewives, retired workers, and others not directly connected with any forest industry own most of the forest land in the South. Together, the privately owned southern woodlands of less than 5,000 acres would make up an area equal to that of Alabama, Arkansas, Louisiana, and Mississippi combined. These 128 million acres are two-thirds of the South's commercial forest land. Their production is sputtering along at about one-third of their potential timber-growing capacity.

Researchers concerned with the problems of small private ownerships hope to discover the underlying causes of neglected forests. To do so, they must learn more about the owners—both the ones who find sufficient reason for practicing forestry, and those who do not.

Landowners are encouraged to practice good forestry when they can feel that there will be ready markets for their products.

Resource specialists in the New Orleans Office publish reports on the forest resource. Such reports help both suppliers and consumers anticipate market trends.

Landowners need up-to-date information for the most advantageous marketing of their wood products.

Market researchers analyze stumpage and lumber prices, evaluate competition, and explore selling alternatives for woodland managers.

MARKETING

New Orleans

Wood is a complex substance that is processed in hundreds of ways and used in thousands of forms. The complexity of the raw material follows through from manufacture into marketing. Improved marketing practices for growers, processors, and sellers of wood are a main goal of the marketing project.

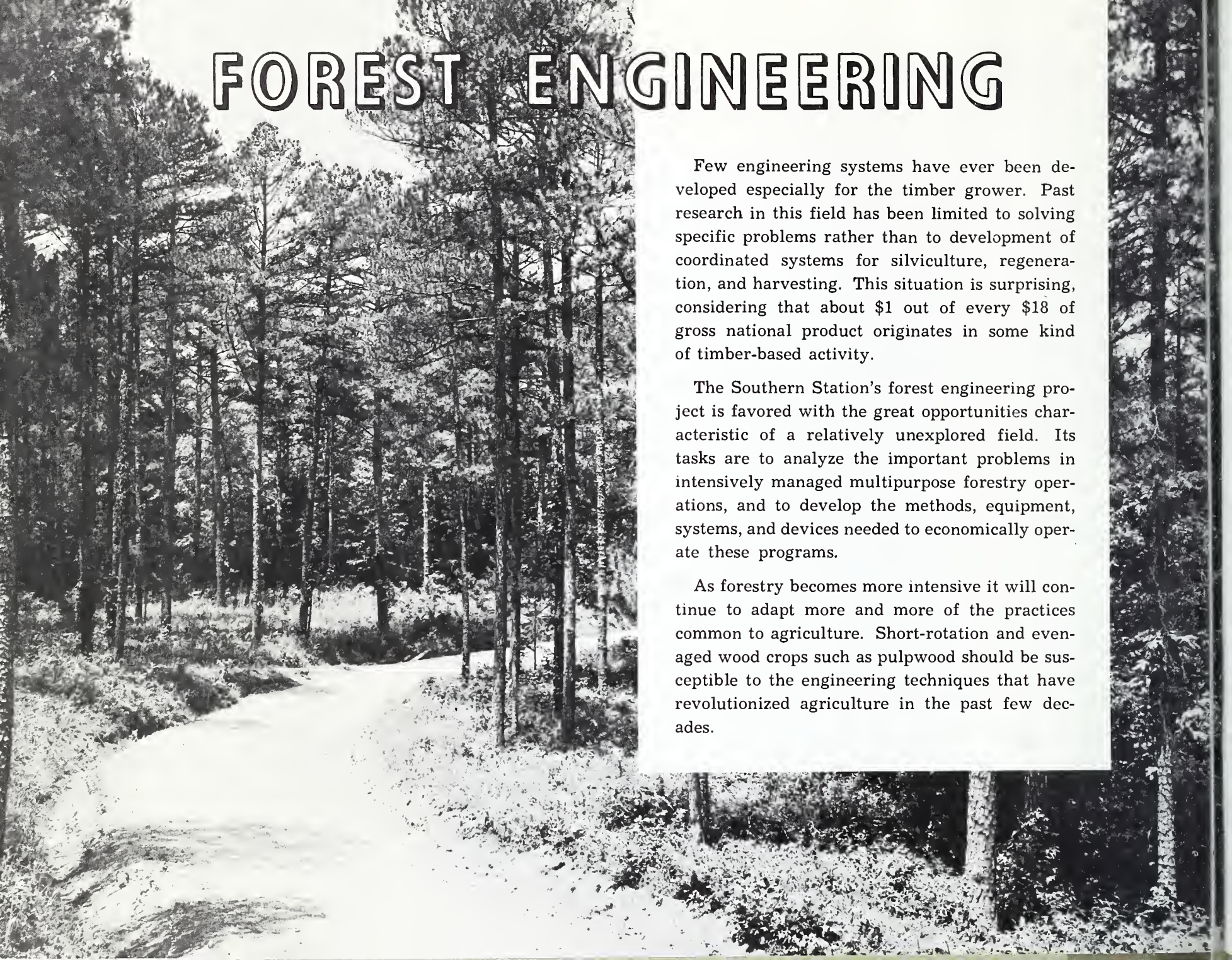
Market researchers have already made practical contributions to the industry by analyzing lumber and stumpage prices, evaluating competition, showing the advantage of selling wood by weight, and suggesting improved milling methods.

One of the large marketing problems is the huge surplus of sound wood in cull trees and little-used species. Finding outlets for this material would increase the supply of wood, reduce costs of timber stand improvement, and improve the returns to landowners and wood-using firms.

In the future, researchers will study such aspects of the industry as logging costs, sawing methods, and management policies relating to cost analysis, quality control, machine purchase and replacement, inventory, and sales systems.

In the field of distribution, researchers will investigate retail selling, buying policies of contractors and builders, problems of wholesalers and jobbers, transportation, and the special considerations of marketing hardwood lumber.

FOREST ENGINEERING



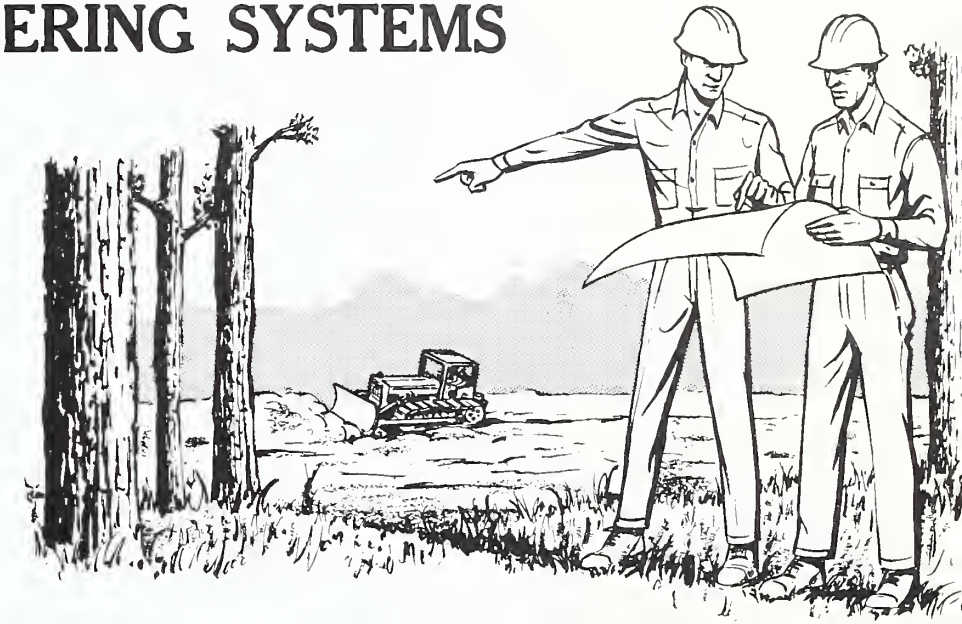
Few engineering systems have ever been developed especially for the timber grower. Past research in this field has been limited to solving specific problems rather than to development of coordinated systems for silviculture, regeneration, and harvesting. This situation is surprising, considering that about $1 out of every $18 of gross national product originates in some kind of timber-based activity.

The Southern Station's forest engineering project is favored with the great opportunities characteristic of a relatively unexplored field. Its tasks are to analyze the important problems in intensively managed multipurpose forestry operations, and to develop the methods, equipment, systems, and devices needed to economically operate these programs.

As forestry becomes more intensive it will continue to adapt more and more of the practices common to agriculture. Short-rotation and even-aged wood crops such as pulpwood should be susceptible to the engineering techniques that have revolutionized agriculture in the past few decades.

FOREST ENGINEERING SYSTEMS

Auburn, Alabama



An engineered system, from pollen to product, is a new concept in forestry and provides a new and promising component of research.

Improved engineering systems for intensive forest management are the objective of the Forest Engineering Laboratory established at Auburn in 1961. Increased efficiency will mean increased mechanization, but emphasis is on the design of entire systems, rather than on piecemeal improvement of machine methods. The best opportunities appear to lie in: (1) regeneration; (2) thinning, weeding, and protection; (3) harvesting and transport; (4) naval stores; (5) forestry on small ownerships; and (6) access for intensively managed multipurpose forestry operations.

Current research is evaluating methods for furrow-seeding southern pines and making precommercial thinnings. The Laboratory also seeks to develop systems for stabilizing multipurpose forest access roads.

Cooperative studies with Auburn University have investigated systems for moving pulpwood chips and a second cooperative effort, now in progress, is the analysis of the naval stores industry.

The Laboratory's program, a long-range one, will develop as time and facilities permit, but comparisons with other basic industries show the need for strong effort. By reducing costs of raw materials, improving labor output, and eliminating physical drudgery, engineering research can greatly enhance the competitive position of wood.

The engineering project at Auburn devises and tests machines intended primarily for forest uses. The small crawler-seeder is an experimental model, being given field trials.

FOREST PRODUCTS UTILIZATION

More than 40 pulpmills and 2,000 sawmills depend upon southern forests for raw material. Hundreds of specialty plants in the South turn out thousands of different wood products—everything from buttons to beams, and from pulp chips to charcoal. All of the steps in harvesting and processing the South's forest resource into these myriad products comprise the field of investigation for the Southern Station's utilization research specialists.

Uses for timber are changing. A few decades ago, wood was the undisputed leader among building materials. Today, competing products threaten its domination in construction of homes and other buildings. Responding to the challenge, wood manufacturers are finding new—and lucrative—markets by tailoring their processes more closely to individual customer needs and preferences, and by raising quality control standards in seasoning and machining.

Without proper liaison, communications between wood industries (where the majority of utilization problems arise) and the research units (where the answers may be found) are often sluggish. Utilization specialists, constantly visiting industries throughout the Midsouth, foster the necessary two-way flow of information. Individual service needs are often referred to utilization and marketing specialists of the various States, and of the Division of State and Private Forestry in the Southern Regional Office of the Forest Service.

Conversion of mill residues—once merely a waste—to merchantable pulp chips is an example of the results possible from utilization research.

The channeling of wood products toward their best end-use should begin in the forest.

IMPROVEMENT IN TIMBER UTILIZATION TECHNOLOGY

Alexandria, Louisiana, and Stoneville, Mississippi

Utilization of southern pines. Utilization research at Alexandria, which began in May 1963, is in the first stage of a program that eventually will be of great value to the southern pine industry. The project, starting with one scientist and a little laboratory equipment, will employ specialists in wood technology, plywood, glues, and coatings.

Early research at Alexandria has discovered promising ways of converting southern pine boltwood into straight laminated structural beams of uniform high strength. The process uses new methods to recover virtually all of the wastewood in the form of pulp chips or flakes for particle boards.

Since log-run southern pine is highly variable, research is needed that will define in detail the properties of this raw material. Improper quality levels imposed to serve all purposes have proved costly in the past. As profit levels become more critical, information necessary to channel the right kind of wood into the proper production stream will be required to maintain southern pine in a competitive position.

Utilization of southern bottom-land hardwoods. The per-unit value of southern hardwoods is highly variable—even more so than that of pine. High-grade hardwood may be worth three times as much for good saw logs as for pulpwood, and up to 16 times as much for veneer logs as for pulpwood. Proper utilization is, therefore, of first importance to the southern hardwood industry. The research at Stoneville will take three approaches toward improving hardwood utilization.

Timber quality studies will correlate the properties of the various wood species with the manufacturing process and the way in which the end product is to be used.

Wood processing research aims at relating inventory, harvesting, primary manufacture, seasoning, and storage to more profitable use of hardwoods.

Research on end-use environment to guide selection of raw material and manufacturing methods.

. . . STATION MANAGEMENT SERVICES . . .

Station Management was created in 1957 to bring together many of the nontechnical supporting services required by a complex research program. Its work is divided among six branches: Personnel Management, Publications and Information, Administrative Services, Engineering, Budget and Finance, and Statistical Services.

PERSONNEL

This branch is responsible for processing appointments, separations, classification of positions, pay and status changes, awards, performance evaluations, safety reports, training, retirement, insurance, leave, records, health benefits, and other matters of employee welfare.

PUBLICATIONS

The Editorial Section of the Publications Branch plans, edits, and arranges publication of research findings. Its outlets are professional and technical journals, popular periodicals, and the various series of the Forest Service and Department of Agriculture.

Research Information Services operates within the Publications Branch; it concentrates on bringing research results and activities—in popular form—to audiences not reached by the more technical outlets.

The Station Library also functions as part of the Publications Branch. It acquires books, pamphlets, and bound periodicals; routes current material; and provides bibliographic and reference service to research men, both in the New Orleans Office and at field locations.

ADMINISTRATIVE SERVICES

Within this branch fall the many responsibilities generated by management of property, procurement, contracting, space, motor vehicles, records, and forms. Other activities include mail, messenger, duplicating, receptionist, and typing services.

ENGINEERING

This branch, created in 1962, offers engineering assistance to the Director, Assistant Directors, and Project Leaders on construction and maintenance of roads, buildings, water and sanitary systems; on site development, equipment use, and other matters requiring this type of specialized knowledge.

BUDGET AND FINANCE

This branch is responsible for accounts payable, including payrolls and reimbursement for travel expenses, accounts receivable, financial control accounting, property accounting, budget formulation, and drafting and administering formal agreements with cooperators.

STATISTICAL SERVICES

The Station's biometrician has three main functions: (1) consultation in the design, analysis, and interpretation of experiments; (2) assistance in data processing and service computing; and (3) statistical training for subject-matter specialists.

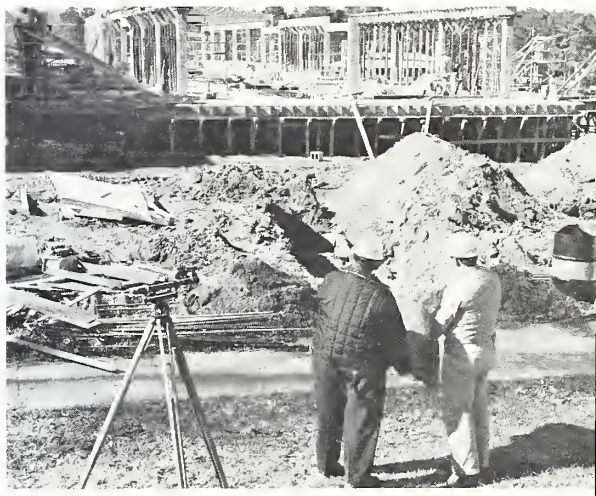
A Word About Publications

Most of the manuscripts by Southern Station personnel are published in one of three ways: by periodicals (scientific journals, trade or conservation magazines); through the U. S. Government Printing Office; or by the Station itself. No matter where an item is first printed, the Station usually obtains and distributes free copies or reprints.

Most of the publications that the Station issues fall into three numbered series: U. S. Forest Service Research Notes, U. S. Forest Service Research Papers, and U. S. Forest Service Resource Bulletins. Each series carries the identifying letters SO (for SOuthern Station), and is numbered in sequence: SO-1, SO-2, SO-3, and so on. The first in each of these series (SO-1) was issued in 1963.

The Station also puts out a few unnumbered items. These include descriptive booklets such as this one, maps, and miscellaneous material of very localized interest.

You may obtain specific publications from the Station, or be put on the mailing list to receive new publications on subjects of interest to you.



FOREST AND RANGE EXPERIMENT STATIONS AND FOREST PRODUCTS LABORATORY
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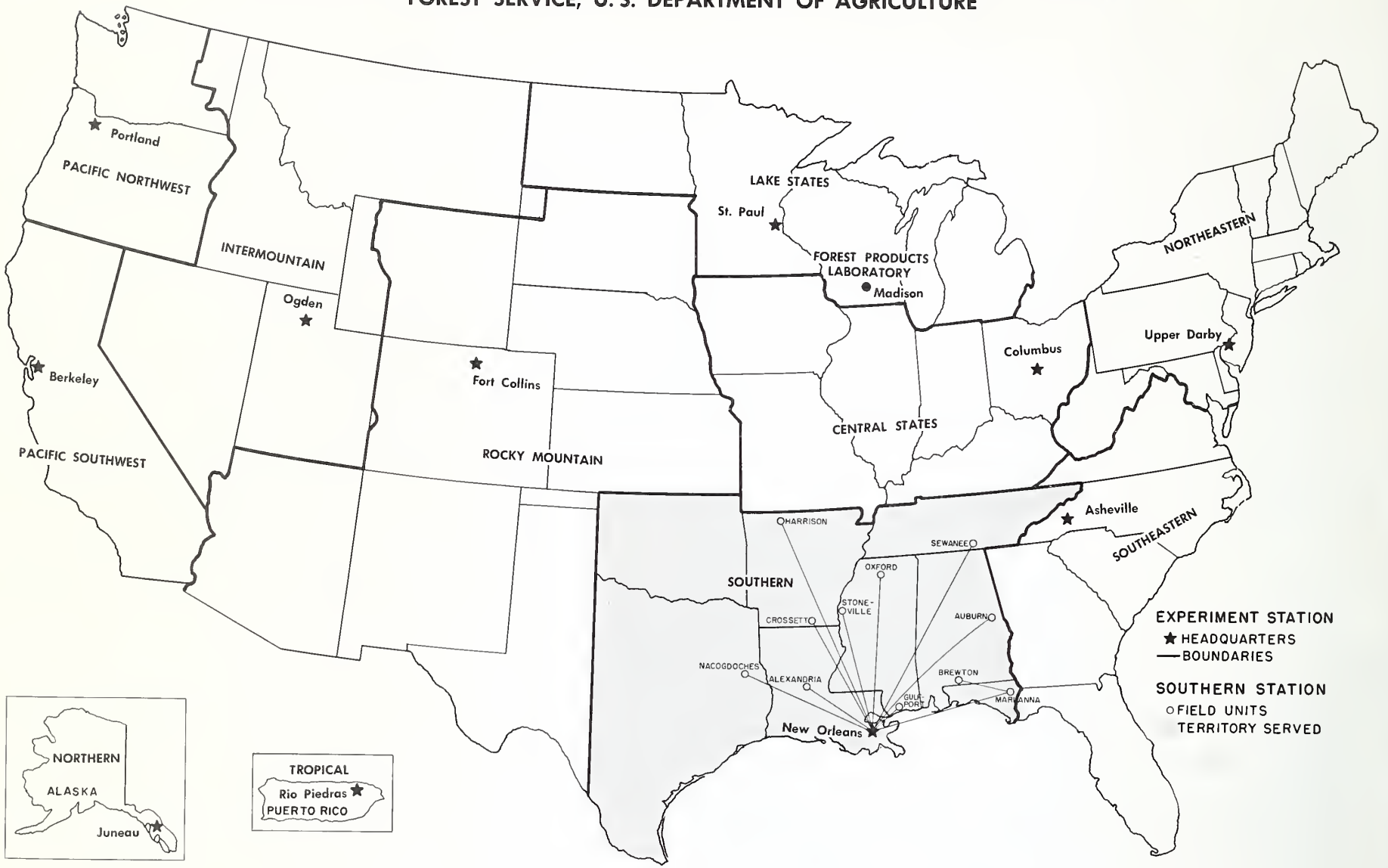

COOPERATORS AID THE STATION'S RESEARCH

The Southern Forest Experiment Station receives valuable assistance from private individuals, industrial firms, schools, associations, and agencies of State and Federal governments. These cooperators provide such aids as land, timber, buildings, cattle, tools, money, labor, and special skills and services. In so doing, they speed many experiments to completion and make possible some research that otherwise could not be attempted.


FOREST
RESEARCH
THE KEY TO
PROGRESS